BEHIND THE SCREEN: AN EXPLORATION OF COLLEGE STUDENTS' PRACTICE OF INTELLECTUAL SELF-EFFICACY IN COMPUTER LAB CLASSROOMS

A DISSERTATION

SUBMITTED TO THE GRADUATE SCHOOL

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS

FOR THE DEGREE

DOCTOR OF EDUCATIONAL STUDIES

BY

CYNTHIA S. CASH

DISSERTATION ADVISOR: DR. KAREN FORD

BALL STATE UNIVERSITY

MUNCIE, INDIANA

DECEMBER 2018

Acknowledgments

First, I must say that this journey of pursuing my Doctor of Philosophy is a path that God has provided because I know God has always put me in the right place at the right time. Secondly, I am most thankful for my husband, Doug for his patience over the past three years and especially grateful to my beautiful daughter, Olivia. She has encouraged me every step of the way, even though we did not get to graduate together in May 2018, Olivia has continually encouraged and inspired me never to give up. Just like she did when I battled two types of cancer. A special thank you to my sisters, Teresa and Janet, their support and understanding have been much appreciated during my moments of doubt to complete another educational chapter in my life. A special thank you to all of my friends from A – Z; I don’t want to miss anyone’s name because so many of you have supported me in different ways. Many of you listened to me and inspired me with words of encouragement, or you took time to read my proposal but mostly you understood my drive to complete, which took me away from spending time with you. I look forward to spending more time with my family and friends!

A special thank you to Ken Njenga, a graduate assistant who spent over 10 hours in classroom observations plus additional hours to confirmed data codes. Also, thank you to my previous supervisor, Dr. Bruce Sowers for pushing me to pursue my doctorate. A special thank you to my current supervisor, Dr. Joel Whitesel, who has continually supported me. Thank you, Kinare Eouanzoui and Brenda Yates for your assistance, Dr. Marilyn Quick for your guidance, and all of my professors in the educational studies program, I have learned so much from each one of you. Also, thank you Dr. Jennifer Bott and Dr. John Ledbetter for allowing me to work with the Miller College of Business, Information Systems and Operations Management department to study courses taught in the computer lab classrooms in the Whitinger building. I am most appreciative to the instructors of the course for allowing me to observe their classes. Also, thank you, Rob Bignell, for your quick editorial assistance with my dissertation. Most importantly, a huge thank you to my exceptional committee, Dr. Karen Ford, Dr. Jill Bradley-Levine, Dr. Michael Ndemandu, and Dr. Melinda Messineo, for your continued support, encouragement, and guidance during this journey. Each one of you has supported and inspired me in ways that I will never forget but most importantly, I am grateful for what I have learned from each one of you during this journey.

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CHAPTER ONE: INTRODUCTION

The learning environment, like a traditional classroom, helps to develop a sense of belonging and belief of self-efficacy within a learning community. Recognition of this sense of belonging and identification within a learning community dates back to the work of John Dewey and Lev Vygotsky (Gordon, 2016). Dewey and Vygotsky understood that education is not an individualized process but rather a social interaction with teachers and students in the classroom. Students spend most of their day surrounded by peers in a context that develops into a shared sense of community in the classroom. McMillan and Chavis (1986) defined a sense of community as “a feeling that members have of belonging, a feeling that members matter to one another and to the group, and a shared faith that members’ needs will be met through their commitment to be together” (p. 9). A students’ sense of belonging in a traditional classroom can be an indicator of intellectual self-efficacy, or self-belief in knowing which impact success in the course (Osterman, 2000). Harris (1995) discovered “the shared environment that leaves permanent marks on children’s personalities is the environment they share with their peers” (p. 483). A student’s perception of belonging or being a part of a community in a computer lab classroom requires a level of engagement and interaction between the student and instructor that ultimately contributes to the student’s retention, completion, and success. Yet, there is little research on how social interactions that occur in traditional classrooms converted into computer lab classrooms impact student engagement and interaction.

While classroom computers provide unlimited access to information and an opportunity to communicate and interact with the teacher, the computer screen can encourage or discourage the social interactions that contribute to the development of intellectual self-efficacy (Solhaug, 2009). Even though the use of technology in the classroom engages students in active learning or meaningful experiences, opportunities to critically think about the process or purpose of the use of technology in the classroom creates a challenge to content mastery. Researchers Bradley & Lomicka (2000) found that a student's perception of the computer lab classroom environment is "like going on vacation" from a traditional classroom. In addition, students' perception of the individual workstations as designed for independent work contradicts the idea of social interaction that further develops a sense of belonging, confidence, and empowerment (Bradley & Lomicka, 2000). However, limited research focused on the practice of student's perception regarding interaction and engagement in a computer lab classroom. Therefore, the need existed for a mixed method study to explore student's perception of interaction and engagement in three computer lab classrooms arranged differently by rows within a traditional classroom design.

This first chapter presents background information along with the details of the problem, the purpose, research design, and the significance of this study related to a student's confidence in knowledge or intellectual self-efficacy in a computer lab classroom. Furthermore, the study explores the interactions of undergraduate students enrolled in an Introductory Business and Computer Applications course in three computer labs configured differently by rows. The subsequent sections include the background, research questions, generalized assumptions, delimitations, and several key terms used in the study. The chapter concludes with a summary of the research.

Background of the Research

During the past two decades, education has increasingly seen an emphasis on student engagement, motivation and interaction in traditional classrooms (Bartimote-Aufflick, Bridgeman, Walker, Sharma, & Smith, 2016). In the latter part of the 1990s, the Department of Education provided grants to secondary schools (9-12) that started the trend of converting traditional classrooms into computer lab classrooms after receiving one-to-one technology grants. The one-to-one computer initiative grants provided funds for secondary schools to purchase enough computers that would allow each student access to use technology and prepare students for 21st-century learning. A recent meta-analysis of 10 studies supports the positive impact of the one-to-one computer program, yielding an increase in students' performance in English, writing, mathematics, and science (Zheng, Warschauer, Lin, & Chang, 2016). However, the research is limited in regards to students' perception of feeling confident in knowing or having intellectual self-efficacy due to the barrier of a screen that limits social interaction or engagement in class (van Dinther, Dochy, & Segers, 2011). Other studies have shown interaction increases engagement, motivation, and feedback, which in turn increases the students' self-belief in knowing the content. (Anthis, 2011; Beatty & Gerace, 2009; Campbell & Mayer, 2009; Carless, 2006; Duncan, 1996; Evans, 2013; Lazowski & Hulleman, 2016; Pintrich & De Groot, 1990; Shaffer & Collura, 2009; Zahay, Kumar, & Trimble, 2017). The students' belief in their competence or level of confidence can affect their desire to continue to learn in school. After secondary school, some students lack the confidence to pursue a post-secondary education due to prior experiences of engagement in school (Davis, 2003). For example, students drop out of high school for various reasons and later realize the need to obtain a high school-equivalent diploma for employment.

A recent study by Lerdpornkulrat, Koul, and Poondej (2018) indicated students' lack of confidence has criticized teachers, classmates, schools and home environment as an indicator of why students drop out of school. In fact, little research has explored the practice of classroom engagement, participation, and interactions based on the students' perception of confidence in learning regardless of the learning environment, notably traditional classrooms. However, several logistical challenges arise when converting traditional classrooms into computer lab classrooms. Among them are the placement of computers based on room dimensions, power supply, and network/internet connectivity. Additional challenges include instructor pedagogy within these spaces and how the teacher implements active learning strategies that motivate students to learn while thinking and doing activities while using computers. With technology-enriched classrooms, teachers' struggle implementing the best pedagogical strategies to engage and interact with students, as the computer screen might be viewed as a potential hindrance to or distraction in preparing young people to appreciate life skills taught in school. Schools provide students with a solid base of knowledge, character building and the skills required to be contributing citizens to society in the future (Solhaug, 2009). Furthermore, at current workplaces and future businesses, employers expect students to be model employees with character, knowledge and the skills to be mobile, collaborative, and communicative while being connected to an international digital world. It is important that schools and universities design technology-enhanced classrooms that they explore students' perception of interaction and engagement. To this end, this study explored how computer lab classrooms configuration affects student confidence and competence. In the next section, the purpose and design will be described with the significance of the study followed by the research questions.

Purpose Statement and Design

As educational institutions face financial constraints, little attention has been devoted to understanding how interaction and engagement in computer lab classrooms impacts students' perception of learning. The purpose of this study was to explore the impact of such interactions in computer lab settings and to determine what how room design impact a learners' intellectual self-efficacy andbelief in the knowledge of content. While computer lab classrooms can support pedagogy, the arrangement of the computers in the classroom can affect student's self-efficacy because the computer screen can inhibit social interaction and impact a student's perception of engagement..

A convergent parallel mixed methods approach provided students with an opportunity to evaluate computer lab classroom configuration, interactions, and self-belief through an online survey. The online survey included two open-ended questions to gain insight into how students define engagement and interaction in computer lab classrooms. During the deployment of the survey, the researcher gathered thick descriptions of interactions during classroom observation of the three computer lab classrooms. The study invited 480 undergraduate students enrolled in an Introductory Business and Computer Applications (IBCA) course at a Midwestern College of Business to voluntarily share detail responses in the open-ended online survey. In addition, the findings were distributed to the department's renovation committee at the Midwestern College of Business for analysis of future redesign and renovation of the current computer lab classrooms, with the expected completion of renovations in summer 2019. A purposeful sampling of one course within the Midwestern College of Business provided insights for other departments that utilize computer lab classrooms, which inspired this research.

In addition, the research seeks to test Bandura's self-efficacy theory (1977) and social cognitive theory (1989). Questions in the survey assess whether students' interactions while sitting behind a computer screen effect students' self-efficacy in a computer lab classroom. By combining data from the quantitative and qualitative portions, the researcher was able to evaluate the degree to which a student's perception of interaction in a computer lab classroom impacted their sense of self-efficacy and competence. In addition, differences within one set of results based on interactions were examined and organized to conduct further analysis of the qualitative data. Creswell and Plano Clark (2011) confirm that a mixed methods study provides valuable insight into the identification of key variables, for instance, the three different configurations of computer classrooms. A convergent parallel mixed-methods design provided a theoretical lens that strengthened the validity and reliability of the research (J. W. Creswell & Plano Clark, 2011).

The next section describes the design of the study and the research questions to explore engagement, interaction, and self-efficacy in computer lab classrooms.

Research Questions

In this mixed methods study, three areas of concern were investigated in regard to students' perception in the classroom based on the computer classroom configuration: engagement, interaction and intellectual self-efficacy. The following research questions guided this study:

1. What are students' perception of the configuration of computers in the classroom?
2. What are the differences in students' engagement and interactions based on the configuration of computers in the classroom?
3. How does the configuration of the classroom impact students' perceptions of engagement and self-efficacy?

This study looked at the design of computer lab classroom environments from a new perspective, that of the students. Most studies on computer lab classrooms have focused on teaching strategies to integrate technology for 21st-century skills –critical thinking, communication, collaboration, and creativity for future careers. This study shifts the focus to students' perception of traditional classroom spaces converted to computer lab environments for teaching strategies that match the objectives of the course, not availability of space. There is little research that looks at the student perception of the classroom environment classroom. Therefore, the significance of this research will be described in the following section.

Research Significance

This study explored, three areas of concern typical of a computer lab classroom: engagement, interactions, and intellectual self-efficacy. “Technological advances have been presented as ways of improving pedagogy and/or reducing teaching costs for much of the twentieth century, but the actual pedagogic practice has been stubbornly resistant (Temple, 2008).” For instance, some first-year undergraduate students attending college classes appear to hold onto previous rules of engagement, formed by the social climate in secondary classrooms. As an instructor questions the students, a method used to gauge students’ comprehension of the subject, many students hesitate to participate willingly in class. One student shared after class with the researcher that the reason for not participating was based on previous experiences in high school computer labs, which was a place to work individually on projects. Therefore, the significance of this research needs to explore how interactivity in a computer lab classroom affects intellectual self-efficacy. The lack of confidence in knowing leads to less classroom interaction and heightens students’ anxiety, fear, and stress which can be attributed to disengagement or limited interactions in the classroom.

Classroom interaction is significant because each student may not have an opportunity to participate based on the configuration of the classroom. Computers in the classroom are tools that limit social interaction among peers due to the placement of the computer screen. A computer screen that measure 24 inches limits the view of the front of the room and peers seated in rows. In my experience, as an instructor, students are forced by room design to only engage with peers seated next to them. Therefore, I explored the relationship of interactivity to developing self-efficacy in a computer lab environment. I believe active participation in class develops a learners' self-efficacy through engagement, being part of the community of learners (McMillan and Chavis, 1986). Although instructors might not be aware of the environmental impact of rows or individualized workstations on the students' belief of self-efficacy, instructors are focused on outcomes of instruction . In addition, based on the findings, an instructional strategy as Solhaug (2009) suggested could be developed that incorporates positive collaborative experiences with the aid of an interactive, collaborative, communicative room design with computers that build a community of life-long learners.

Theoretical Framework

This research was grounded in Albert Bandura's (1977) concept of self-efficacy and Bandura and Wood's social cognitive theory (1989). Self-efficacy as a concept relates to an individual's self-esteem. The learner builds self-esteem by learning and mastering challenging skills in life. Belief in personal success against all the odds requires a person to have strong faith in their ability to learn new things, which tends to develop a feeling of self-efficacy. Self-efficacy beliefs are developed from four sources: observation; performance; emotion; and persuasion. The most powerful of these, Bandura (1977, 1989) hypothesized, included persuasion related to knowledge. The social cognitive theory is conceptualized as the self-perception of students' capabilities to meet situational demands based on current states of motivation, the course of actions needed, and cognitive resources. Thus, a theoretical framework of self-efficacy and social cognitive theory will be applied to the study. Self-efficacy expectations are students' primary determinant in choosing activities during stressful situations (Bandura, 1989).

An example of self-efficacy is a student persuaded by an instructor to master knowledge of content or definitions of words over how to apply skills that are required to gain knowledge. In stressful situations or environments, students tend to lack confidence in the comprehension of the content, which Moos and Azevedo (2009) described as intellectual self-efficacy. One part of the social cognitive theory refers to stress as a source that hinders a students' motivation to interact in traditional classrooms. Students report feeling stress over seating arrangements in the classroom that impact their ability to interact with the instructor and other students. Emotions play a role as well especially within a computer lab classroom. Harris (1995) argued that "children find out what kind of people they are – quick or slow, beautiful or plain, leader or follower – by comparing themselves to [their peers]" (p. 473). As the classroom environment creates a community atmosphere, especially in a computer lab this research will be grounded in Bandura's social cognitive theory (1989) and Bandura's concept of self-efficacy (1977). This research explored the causes associated with engagement and interactivity in a computer lab classroom that contributed to intellectual self-efficacy. The following section will define key terms used within the study in order to provide context.

Definition of Terms

Definitions provide a common language for the readers, researchers, and educators to define the context of the study:

Computer lab classroom: a traditional classroom that has been converted into a lab by the addition of rows of individual desktop computers (Park & Choi, 2014).

Engagement: defined as social or academic and may stem from opportunities in the school or classroom for participation to build interpersonal relationships, and intellectual endeavors (Fredricks, Blumenfeld and Paris, 2004).

Formative assessment: is a type of assessment that increases learners' self-regulation of knowledge through continued prompts of questions by an instructor (Usher and Pajares, 2008).

Intellectual self-efficacy: social factors affecting learners' judgments of their intellectual efficacy based on peers' perceptions of intellectual knowledge. The performances of other students motivated by social comparison provide enhancement through goals and positive incentives, and instructors' interpretations of learners' successes and failures in ways that reflect favorably or unfavorably apart from the formal instruction (Bandura, 1989).

Interactions: interaction included instances of information exchange between two or more learners. (Bradley and Lomicka, 2000).

Participation: action and interaction ranging from responding peer to peer or to a teacher's directions to activities (Fredricks, Blumenfeld and Paris ,2004 as cited in Finn, 1989).

The following section described the researcher subjectivity regarding the research to provide context.

Researcher Subjectivity

I have chosen to study the interactions of students in a computer lab while observing students sitting behind the computer screen. An example of the various behaviors or interactions may include making no eye contact with the instructor, slouching, or rarely looking up past the computer screen when asked to respond to a question. In teaching undergraduate courses, I have noticed that students seldom volunteer to answer questions, especially when sitting behind a computer screen, which leaves the instructor to call on them to actively participate in class. As the called upon student sounds unsure of the response, I also have observed other students' behaviors of not listening to the student, being disgusted by the interruption in class, and a look of judgment about other students' response.

After one class, a student shared with me the reason for not interacting during class – social stigma, which created doubt in comprehension of the content or material taught in the classroom. The response of social stigma by the student caused me to think about how the configuration of the room could affect the classroom dynamics and student interactions. In addition, I struggled to walk between the rows of computers to assist students within the classroom.

At my previous position as the director of technology in a P-12 rural school, the issue of classroom configuration challenged my thoughts about how computer labs were designed during the building of a new secondary school in 2007. During the architectural design of the secondary school, architects focused on how to use the room dimensions with minimal consideration of the students. Room dimensions and power outlets were the first issues considered in setting up the computers, which created challenges within the space to be a collaborative learning environment. I am intrigued by how interactions can create a positive, thriving learning environment that nurtures life-long learning for every individual.

For that reason, this study has combined literature for architectures, classroom designers, and educators regarding the impact interactions in computer lab classrooms has on self-efficacy. My interest continues to identify the purpose of computer lab classrooms instruction that enhances students' experience in learning for future careers. The next section guides you through the organization of the research.

Organization of the Research

Chapter One identified the purpose and significance to explore students' perception of computer lab classrooms and the effect on self-efficacy. While the comparison of students' intellectual self-efficacy is based on the interactions within the classroom, perhaps a change in instructional strategies is needed that supports active learning while students sit behind a computer screen. For this reason, this study explored students' perception of engagement and interactions in traditional classrooms converted to computer lab classrooms that contributes to the literature. Researchers Gibbs and Taylor (2016) found the student often learns in unintentional ways regardless of engagement, or interactions. Thus, an increased amount of research has emerged that shows how a student's academic performance is affected by the environment in which the student learns (Cheryan, Ziegler, Plaut, & Meltzoff, 2014).

Chapter Two presents a review of the literature that includes the underlying theoretical framework and findings surrounding the current implementation of engagement, interactions and student perceptions in a computer lab classroom. Chapter Three describes the mixed-methods design used to carry out the research in three computer lab classrooms arranged differently by rows. An online survey collected quantitative data with open-ended questions to capture qualitative data including classroom observations of interactions that added validity to the findings after data analysis. Chapter Four provides the findings of the analysis of the quantitative and qualitative data. Finally, Chapter Five connects the previous chapters in a summary that reviews the results, interprets the findings, and provides recommendations for future research.

CHAPTER TWO: REVIEW OF THE LITERATURE

The average American student entering kindergarten will spend more than 12,000 hours in some type of classroom before graduating from a secondary school (Cheryan et al., 2014). During the approximate 12,000 hours of learning, the classrooms are traditional in regards to the seating arrangement, with rows facing the front of the room. In a traditional undergraduate computer course, the classroom environment is structured like many secondary schools, except now students are seated in rows, facing the front of the room or in a configuration of rows that allow desktop computers to fit in the room. In addition, an increase of computers in the classrooms includes students with iPads, personal laptops, and mobile devices which adds to the perceived distraction in the classroom space. According to Kay and Lauricella (as cited in Dahlstrom, Walker, & Morgan, 2013), "almost 90% of students attending a university or college owned a laptop computer." Even though the majority of students at universities or colleges own laptops, institutions still teach some courses in computer lab classrooms. The challenge now includes what some refer to as a barrier – the computer screen – between students and teachers. Regardless of the computer in front of the student, research is limited to the arrangement of the classroom, converting traditional classrooms into computer lab classrooms. This review of literature will identify the gaps in the research associated with engagement and interactions in a computer lab classroom related to intellectual self-efficacy. The research regarding the conversion of traditional classrooms to computer lab classrooms has limited content. Therefore, this study will contribute to the phenomena of exploring students' perception of sitting behind a screen.

This chapter begins with the introduction, followed by the theoretical framework connected to intellectual self-efficacy and social cognitive theory in a computer lab environment.

Next, the challenges and solutions identified from research addressing engagement and interactions in the classroom. In addition, the historical background of traditional classrooms converted to computer labs, and students' perceptions on classroom environment concludes the review of literature that further supports the research questions to add context to the research. The next chapter describes the mixed methods design used to carry out the research in three computer lab classrooms arranged differently by rows in a traditional classroom.

Intellectual Self-Efficacy

The learner builds self-esteem by learning and mastering challenging skills in life. Albert Bandura (1977) described self-efficacy as a concept related to self-esteem or self-belief. Self-belief in success against all the odds requires people to have strong faith in their ability to learn new things, which tends to develop a feeling of self-efficacy. Self-efficacy beliefs are created and developed from four sources: observation; performance; emotions; and persuasions. The most powerful of these, Bandura (1977) hypothesized, was persuasion related to obtaining knowledge. For example, a learner persuaded by instructors to master knowledge of content or definitions of words instead of the skills required to apply the knowledge based on self-belief. Originated by Bandura (1977), self-efficacy expectations are learners' major determinant in choosing activities in the classroom. In addition, Moos and Azevedo (2009) described self-efficacy as the premise of social cognitive theory. The social cognitive theory is conceptualized as the self-perception of learners' capabilities to meet situational demands based on current states of motivation, the course of actions needed, and mental resources. One part of the mental or cognitive resources that hinders engagement or interactions relates to the classroom environment. Students' interactions or involvement can be associated with a student's belief that the assignments are interesting and of value (Pintrich & De Groot, 1990). The classroom environment at times can constrict student involvement or interaction that further develops a student's intellectual self-efficacy or belief in knowing the content. Self-belief of content and a willingness to participate in the classroom takes on an alternative evaluation of knowledge. Within academic environments, the ability to interact with not only peers but the teacher starts early in pre-school and continues during the formative years of young learners, which can be contributed to the classroom environment. For example, the entire classroom studies the same material, and the teacher calls on a student as a method of engagement in the classroom. The student often feels anxious about giving the wrong answer in front of peers or drawing attention to oneself that develops a prevailing opinion of the student (Marty, Heraud, Carron, & France, 2007). The prevailing opinion of other students in the classroom contributes to social comparison.

Social comparison in computer lab classrooms plays an influential part in the development of self-efficacy, especially when classroom experiences represent academic failures or successes. Knowledge comparison with peers creates a level of uncertainty about a student's abilities or limitations of learning regardless of the learning environment. Engagement and interactions in the classroom reinforce a student's confidence to complete assignments, which are often shaped by the social conformities of not fitting in with the class (Usher & Pajares, 2008). As students' reputations are established with peers, individuals of similar capabilities may deter the intellectual self-efficacy of the student, instead of depending on self-belief of knowledge (Usher & Pajares, 2008). The empirical findings by Peterson, Brown, and Jun (2015) provide new insights into the effectiveness of interactions as recent studies explore the emotions associated with achievement. Pekrun, Goetz, Titz, and Perry (2002) advocate going beyond test anxiety, which has been studied extensively, and to explore the effect in educational psychology.

Research needs to explore further the causes associated with intellectual self-efficacy based on students' perception of interactions during class in computer labs. Researchers Pekrun, Goetz, Titz, and Perry (2002) suggest research on methods of instruction to prevent, remedy, and recognize the importance of emotional appraisals in the design of an educational environment. Most recently, Lazowki and Hulleman (2016) further explored the roles and responsibility of academic communities to ensure the learner can feel valued for his or her contributions as a member of the learning community. A community of learning should support the students' fundamental need to be confident and motivated with a purpose in being a valuable contributor to society. In an academic society, the community of instructors' value their role in providing knowledge, but the process of learning needs to evaluate the emotions associated with self-comparison and self-doubt. Future research into the nature of the relationship between emotions and intelligence or thoughts about learning and what motivates the student in the processes of interpretation, and application of feedback that developments a learners self-concept (Evans, 2013; (Pekrun, Goetz, Titz, & Perry, 2002). In addition, researchers recommend further exploration of the relationship of emotions associated with feedback during moments of interaction within the classroom to gauge a students' knowledge. Clark (2012) described a wide range of opportunities to further research the relationship of goals and objectives during classroom questioning by the instructor as related to the learners' intellectual self-efficacy. One area to explore includes instructors' design of the academic environment to create safe boundaries for reflection during in-class questioning, even behind the computer screens. Researcher Pajares (1996) suggested teachers would be well served by paying as much attention to students' perception of competence to actual competence, perceptions may more accurately provide insight into success selecting majors and career decisions.

Therefore, the topic of students' perception in classroom design is relevant, even though the focus has been on teacher's perception as reported in a recent article, *When Faculty Design Classrooms of the Future*, published in Campus Technology (August 2018). During the first Mosaic Design Symposium held at Indiana University, the program allowed 21 instructors to explore other active learning classrooms to redesign traditional classrooms. The common theme for redesigning classrooms included space designs that allowed students to interact with instructors, peers, and technology in the room. Another theme was the ability to quickly move the room around for easier access to students in groups with access to mobile technology.

While faculty in the Mosaic Design Symposium identified common themes for classroom design (small group, large classroom, project-based) to encourage interaction and engagement, the problem remains of understanding how students' belief in successful or unsuccessful performance has influence on mastery of skills in the classroom. As Schunk (1989) describes a students' ability to distinguish success from failures requires knowledge of self-belief in the mastery of experiences. Researchers Usher and Pajares (2008) and van Dinther, Dochy & Segers (2011) describe the mastery of experience as an authoritative source in developing a strong sense of success or failure when performing a task that demands applicable knowledge and skills, although researcher Pajares (1996) argues the role of social cognitive theory in relationship to self-efficacy due to a lack of clarification of belief with a level of confidence regardless of the environment or behavior of other students.

One environment – a computer lab classroom – creates an opportunity to teach students applicable skills and knowledge using technology to gain mastery in the experience. Yet, the understanding of how self-efficacy relates to the environments still needs further research. As

Usher and Pajares (2008) describe learning environments that foster competition, yet in a computer lab classroom, how can students make frequent comparisons of how their knowledge and ability to complete tasks compares to other students in rows? Researchers van Dinther, Dochy & Segers (2011) discovered the type of experience, educational experience as a direct experience, i.e., simulations and role-plays, in itself is not automatically a mastery experience that builds self-efficacy. To further support previous research, Fong and Krause (2014) found mastery of experiences was a significant factor of underachievers' sense of self-efficacy as reflected in weekly journal entries and self-reported surveys. "When students share what makes them feel more or less confident, they provide a glimpse through which we can explore how they view and process their progress towards learning" (Pintrich, 1990). Researchers Compeau & Higgins (1995) described the importance of understanding an individuals' self-perceptions and finding ways in which to address them develops into behavior of self-belief. Behavior modeling involves observing someone else performing the behavior as a means of learning approach to computer training. Social persuasion exerts an influence on self-efficacy based on behaviors in the classroom. "Reassurance to users that they are capable of mastering the technology and using it successfully can help them build confidence" (Schunk, 1989). Schunk's (1989) research shows self-efficacy is impacted by performance-based treatments, i.e., role-playing or models. Social skills are taught in school. Studies conducted in real schools are needed. Booth and Gerard (2011) found that self-efficacy and self-esteem are often related, but evidence reveals a positive effect from student self-efficacy for academic success does not likewise demonstrate a direct positive influence from self-esteem on school achievement" (Ross and Broh, 2000). In addition, researchers Bartimote-Aufflick, Bridgeman, Walker, Sharma and Smith's (2016) analysis of university student self-efficacy identified a gap in the studies that support institutional, department or degree/major program levels – studies in this review were either conducted at the semester-long course/module, or at individual learning activity/assessment task levels. Most recently, Srisupawong, Koul, Neanchaleay, Murphy, and Francois (2018) suggested replicating a study in the conventional computer-science classroom but in computer-based learning environments in general. The researcher's data collected was limited to surveys and students' perception. Observations and/or interviews might be used for data collection in subsequent studies to determine if students' perceptions correspond to their lived experiences.

One solution to the dilemma of the effect self-efficacy have on learning, researchers van Dinther, Dochy & Segers (2011) state that is knowing factors that affect the development of self-efficacy in higher education related to students' goals can help institutions develop and plan educational programs or spaces for learning. Although Schunk (1989) stated that understanding self-efficacy spans across a students' lifetime, authentic tasks in learning that require applicable skills and knowledge in diverse situations contribute to self-efficacy. Moreover, the ability to change jobs and careers or re-enter school and workplace after an absence of many years with technology changes and the way people work are opportunities to develop a self-efficacy that mirrors success or failure for a person. A person that experiences success or failures had similar self-efficacy affect after achievement or challenges in getting a job. Regarding experiences in computer lab classrooms, researchers Compeau & Higgins (1995) discovered that "Self-efficacy was found to play an important role in shaping individuals' feelings and behaviors. Individuals in this study, with high self-efficacy, used computers more, enjoyed the use of computer and experienced less anxiety. Skills related to job performance indicated a significant impact on affect and computer use" (p. 16).

Engagement in the Classroom

Lawson and Lawson (2013) defined engagement as a passive interaction that only the instructor can arouse by questioning the student in a typical classroom.. Further analysis of instruction in the classroom will help identify social comparisons of knowledge during formative assessments. Students actively engage after participating in a small group that builds trust among peers before speaking in front of the whole class due in part to the fear associated with feeling confused instead of having an incorrect response (Gibbs & Taylor, 2016). Active learning methods within the classroom focus partly on the need to increase engagement or participation regarding the content. Lawson and Lawson (2013) suggest a positive environment leads to engagement or participation in the classroom. A characteristic such as shyness can contribute to the lack of a learner’s classroom involvement, and this could have consequences on his or her academic performance. While the complexity of engagement varies with tools/objects/technologies, tasks, activities or disciplines, people, and place/social settings, the experience should promote positive interactions within the classroom.

As suggested by Karich, Burns, and Maki (2014), additional studies need to identify behavioral variables other than measurement of academic achievement, which indicate that the learner has control utilizing technology that may enhance engagement or participation but may not increase learner self-efficacy. They noted that future research needs to explore other underlying mechanisms as related to the effectiveness of educational technology beyond learner control that more directly relate to positive learner self-efficacy regarding the knowledge of content. As research further explores engagement or participation in the classroom, another behavioral variable to consider would include the motivation of the learner to participate or engage in the content. Motivation described in this section refers to Karich et al. (2014), as a feeling that makes the learner want to engage or participate in the class. Merely presenting the data during a lecture or having the learner read about the study does not actively engage the learner. Little is known about the interactions in a computer lab classroom related to the intellectual self-efficacy described in Bandura's (1989) social-cognitive theory. That is to say, to further identify with the students' perceptions of interactions, an explanation of different types of interaction in the computer lab classroom is further discussed in the next section.

Interactions in the Classrooms:

Bandura (1977 and 1989) argued that self-regulated learning arises where strong perceptions of self-efficacy and transparent feedback co-exist during the in-class assessment of learning. Bandura's ideas concur with others, who see feedback as "pivotal" intervention to self-regulated learning (Schunk, 1989; Butler & Winne, 1995). Black and Wiliam (1998a, b, 2006, 2009) state that the core purpose of feedback is the measure to refine the metacognitive processes required for self-regulation of learning in the classroom (cited in Clark, 2012). While assessment of learning methods increases the learner's self-regulation of knowledge, Usher and Pajares (2008) suggest qualitative approaches, such as in classroom observations, use of questioning techniques, and ethnography would offer insight into what the learner believes to be true. In other words, Dweck's (1986) couched theories of intelligence that inspired a series of interventions to help learners realize that the development of self-efficacy can change and can increase with effort in learning. The intervention requires experiencing challenging opportunities and attitudes to measure their success (Lazowski & Hulleman, 2015). Instructors think about the implications of feedback given during in-class assessment relating to the learner's intellectual self-efficacy. In the next section, literature linked to the purpose of engagement and interactions in computer lab classrooms continues to support the need to explore undergraduate students' perception of self-efficacy. Education continues to seek insight into the phenomena of how interactions in a classroom environment either encourage or discourage the students' ability to want to pursue or continually learn regardless of the learning environment. As Gibbs and Taylor (2016) suggested, the learner often learns in unintentional ways regardless of motivation, engagement, or ability to identify constructive feedback.

In addition, researchers Bradley and Lomicka (2000) study found that students reported being in "tight quarters" and often found themselves working in pairs due to space restrictions. Our participants' conception of the computer lab as a "territorial," "crowded," "individual," and "relaxed" place served to share their perceptions of the interaction that occurred there through the semester. Furthermore, researchers Martinez, Rubia-Avi, Gomez-Sanchez and De La Fuente (2003) discovered the application of computers to collaborative learning had been considered as a new resource for research in the field, due to their capability of logging interactions and processing them automatically. Additionally, new challenges related problems of automatic data management and interpretation and the appearance of new collaborative situations included different forms of interaction (Guribye & Wasson, 2002).

As Martinez, Rubia-Avi, Gomez-Sanchez, and De La Fuente found new challenges with collaborative situations, researchers Bradley and Lomicka (2000) described the interaction with technology that enhanced the learning environment might be viewed as involving three primary players – the learner, the instructor, and the computer. Learner-learner interaction included instances of information exchange between two or more learners. In a computer lab classroom, learner-learner interaction happens when students are engaged in pair work activities or work together to resolve technical or software issues on an individual computer. Student-student interaction in the computer classroom provided a sense of security and helped in resolving technical issues. Participants shared interaction in the regular classroom fulfilled a different purpose by allowing authentic collaboration and construction of learning between students. Students view the regular classroom as being more or less a communicative place, where they worked in groups, communicated their ideas with each other and constructed knowledge together. Yet, Martinez, Rubia-Avi, Gomez-Sanchez and De La Fuente (2003) state that an essential consequence of the use of computers to support collaborative learning is the fact that many researchers saw in it an opportunity for evaluation, due to their storage and processing capabilities. Although, Bradley and Lomicka (2000) suggest that research should reconsider the role that technology and task design play in curricular decisions. Goals should attempt to promote communicative interaction and critical thinking on the basis of that input.

Participation:

Although participation in a classroom might be considered engagement, researchers Fredricks, Blumenfeld and Paris (2004) shared that attempts to define engagement can be problematic. Behavioral engagement draws on the idea of participation that includes involvement in academic and social or extracurricular activities. Participation in school activities that engage students as part of a community is considered crucial for achieving positive academic outcomes and preventing dropping out. The method of to student engagement may be social or academic and may stem from opportunities in the school or classroom for participation in interpersonal relationships, and intellectual endeavors. Campbell and Mayer (2009) suggested that a classroom study would be useful because students might respond differently if there was a real consequence of their engagement. Gomoll, Hmelo-Silver, Tolar, et al. (2017) found that if participants do not develop a shared problem space, they may not converge upon a shared understanding, and thus deep learning for all of the participants is unlikely. Barriers to engagement in complex problem solving and coordination included focusing on individual outcomes, treating personal workbooks as territory (i.e., only recording your own ideas), and failing to acknowledge peer contributions. Solhaug (2009) shared findings with extensive debate and frustration in technologically enriched schools where students and teachers are struggling to develop new and meaningful pedagogical practices. Computers provide unlimited access to information as well as interactive communication, which may give students a more significant influence on their own knowledge development and enhance critical reflection, student empowerment, and more democratic schooling. (Apple & Bean 1995; Solhaug 2003, p. 12). In addition, Anne and Campbell (2012) argue that the Net generation – students born in an environment exposed continuously to computer-based technology – exhibit behaviors that desire constant connectivity, convenience, collaboration and information-rich access (Paul, 2001; Weiler, 2004). This behavior is embedded in the business world, and according to Friedrich, Peterson, and Koster (2011) will impact on the future business environment; how we do business and how the economics of business will be supported by heightened levels of connectivity.

Yet, Lawson and Lawson (2013) and other researchers proceed with the view that students' needs for engagement may precede enhanced motivations to learn. This view prevails when engagement is defined behaviorally with respect to participation. One form of this behavioral research prioritizes the development of new social setting designs attributed to classroom designs and student, teacher orientations. Anne and Campbell (2012) found literature shows that a level of confusion still exists in relation to the questions of how students want to connect during their engagement with university life and what tools would they prefer to use. Universities are challenged with the need to provide contemporary learning solutions to a generation with high levels of connectivity and choice. Solhaug's (2009) study indicated digital access has an effect on critical reflection and may empower students' participation in class dialogues. The research studied laptop schools and computer room schools and discovered no doubt that students in the laptop schools struggle to focus their school activity in the face of all the Internet's temptations.

An alternative approach to the dilemma, Karich, Burn and Maki (2014) studied behavioral variables that affected academic achievement and discovered providing student control with educational technology may enhance engagement, but may not increase student skills. Future researchers also should continue to examine other underlying mechanisms related to the effectiveness of educational technology beyond student control that more directly related to positive student outcomes. Given the increasing use of educational technology, additional research on its effectiveness seems warranted. Researchers Anne and Campbell (2012) found students show a need for connectivity to support learning and interaction. Therefore, the use of social networking sites addresses the connectivity solution, but equally the provision through existing social media sites contains several compromises involving personal space. Personal space even for the middle ground student who sought opportunities to chat and share, but with selected stakeholders only. Observation revealed their willingness to share the information they capture, specifically formal academic work. Their chat and shared activity allows students to discuss how they are approaching an essay or report. Students have learned that by sharing with their friends, they can make the process of learning less time-consuming. They offer each other confidence by sharing, reducing the risk of mistakes and avoiding the process of individual trial and error, a behavior not exhibited in formal virtual learning environments space. Students engaged in sharing are influencing and reinforcing positive activity.

Solhaug (2009) revealed a considerable amount of student time on computers has an “out-of-school focus.” Specifically, schools where students take home laptops, the “out-of-school focus” presents challenges for students. Therefore, students feel more dependent on their motivation and self-regulatory skills, which is a challenge to the learning process for many students, and this also might undermine their feelings of empowerment, participation, and knowledge construction. Results in classes and schools merely state teachers “trial and error” handling of technology. A better thought out, planned, and supervised technological and discursive practice in classrooms might better focus students’ collaboration, participation, discursive practice, and empowerment. Lawson and Lawson’s (2013) cradle-to-career system building offers manifold opportunities for new engagement frameworks and interventions – with the caveat that postsecondary education completion with advanced competence hinges on active, consistent and persistent engagement.

Classroom Environment: Computer Labs

Pekrun et al. (2002) suggest developing personalized or individualized classroom environments in order to avoid the risks associated with social comparison. Such environments tailored to learners’ knowledge and skills reduce social comparison that has the potential to discourage engagement and interactions in classrooms. Traditional classroom environments limit the learner’s ability to perceive an increased capability of learning based on the emotions within the classroom. As learners’ perceptions of engagement in a classroom improve with interactive classroom response systems, Pekrun et al. (2002) discuss that academic emotions are “directly linked to academic learning, classroom instruction, and achievement” (p. 92).

Students are more likely to compare their rate of progress to their self-efficacy than to the social comparison of performance in the classroom. During the early formative years of learners’ experience in secondary school, the classroom environment functions as the primary setting for refinement and social validation of cognitive competencies of knowledge (Harris, 1995). The classroom environment is where the learner develops the cognitive skills of information and application of problem-solving skills needed for school, future careers, and life. As learners gain knowledge of content, their peer's measure, monitor and socially compare each other in the classroom. Many social factors contribute to the cognitive skills toward the learners' interpretation of intellectual self-efficacy. The instructor's interpretations regarding successes and failures during formative assessment reflects favorably or unfavorably on the learners' ability to learn, turning the instructor's interpretations into motivation and incentives to promote students' intellectual efficacy. As learners increase their belief in their own capacity to accomplish activities (related to their aspirations), their levels of interest, motivation, and engagement in class also increase or decrease. Some classroom practices tend to convert instructional experiences into educational inefficacy; for example, traditional lectures are less attractive to learners, further diminishing engagement due to the perceived social comparison cast by peers.

As noted earlier, Park and Choi (2014) state that the classroom itself is one of the critical elements that support students' learning. In fact, Orr (1993) stated that leading figures in environmental studies, environmental education, and environmental design, argue that academic architecture possesses its own "hidden curriculum," hence learning is influenced by how classrooms are designed and constructed. While the information and technology-based society regard memorizing facts and knowledge as no longer required information to learn due to instant access to resources on the internet. The trend now is to develop critical analysis competencies, organizing facts by communicating and cooperating with other professional, and discovering new information to create novel ideas. Moos and Azevedo (2009) state a student’s behavior is based on the interaction between personal factors and the learning environment. As the environment presents new experiences, the student may evaluate current behavior with the new experiences in the learning environment. Pinar, Reynolds, Slattery, and Taubman (1995) found “Technology in the curriculum must be critically evaluated, not uncritically embraced.” Educational problems cannot be solved by focusing on the instruction apart from the curriculum.

In Kay and Lauricella’s (2014) review of literature: 12 articles from 2001 to 2014, challenges students experienced using laptops in higher education. Five main problem areas emerged including: being distracted by other students’ use of laptops; social networking; entertainment; surfing the web; and learning performance. Mercier, Higgins, and Joyce-Gibbons (2016) argue the placement of technology within the classroom may influence the group interactions and learning outcomes. For example, Zhang and Zhou (2017) found that the majority of university classrooms model “classroom, teacher and computer” centered using the whiteboard and projection to impart knowledge. A common phenomenon is for teachers just to read out loud from computers when giving a lesson with the lack of paying close attention to individual differences and useful study. Even though technology may be seen as changing the conception of learning itself: the implications for learning spaces appears to be limited (Temple, 2008). Limited evidence on the role of campus design, as well as the design of individual buildings in supporting student learning. Learning is a social activity, so campus designs are needed that create welcoming, informal spaces for people to meet and talk, and perhaps work in small groups. Given the lack of critical attention paid to evidence based on student perspectives at La Trobe University in Australia, Riddle and Souter (2012) developed principles through applied research in teaching and learning that can inform real-world learning space design projects in a higher education context.

In addition, Brooks (2011) advocated designing and redesigning spaces that are more conducive to learning, claiming that benefits to teaching and learning practices and outcomes outweigh the short-term cost. A constructivist form of active learning encourages pedagogical innovation, improves conceptual, theoretical and applied forms of learning, and increases overall levels of student engagement. Of equal importance, as architects discuss future educational facilities for the next century and beyond, the conservation turns to collaborative spaces. Architects envision flexible and fluid spaces that encourage creative and critical thinking, and free students to communicate clearly where students have a choice in how they work (Lippman, 2015).

At the same time, while students have a choice about continuing their education and how they work, society may lose a workforce educated to compete in the global marketplace if the learning environment is not part of the design decision (Lerdpornkulrat, Koul and Poondej, 2018). In general, the participation, completion rates, dropout rates, and retention rates of college students vary with the institution and country. The high rate of student dropout is a major concern for school, colleges, and universities. Failure to complete courses of study impedes career and income potential and negatively impacts institutions through the loss of reputation, revenue and opportunity to make a difference in students' lives (Sternberg, 2013). Notably, education continues to focus on 21st-century curricula with its ideas about learning centeredness and team-based and/or inter-professional education that is not compatible with the physical learning environments of our universities (Nordquist and Laing, 2014). The physical environment is our "hardware" and should better support our "software" – the underlying ideas of our curriculum that are expressed through a school's vision to achieve inter-professional, learning-centered and student-activated learning.

In addition, Park and Choi (2014) shared a need to understand new classroom design to maximize educational impact and to provide an educational environment that encourages students' active participation in the learning experience. The rapid adoption of classroom designs by universities for active learning spaces attests to the positive impact of students' classroom participation and learning outcomes. Despite the positive outcomes, most university classrooms remain in the style of the traditional classroom. Moos and Azevedo (2009) used experimental designs to examine the relationship between various factors and computer self-efficacy. One area of research has examined the relationship between training methods and computer self-efficacy and has generally found that behavioral modeling is more strongly related to positive computer self-efficacy when compared to traditional method of instruction-based training. Brooks (2011) stated if we are to understand more fully the impact of the physical aspects of formal learning environments, more systematically rigorous research design is necessary to place controls on potentially confounding factors. The research conducted by the OIT research team at the University of Minnesota makes significant progress in the direction as Kay and Lauricella (2014) found in their research. The study suggested that beneficial, active use of computers in the classroom could be organized according to three kinds of activities – research, learning-focused, and collaboration. For example, beneficial activities include learning tasks in the classroom, web research, and the use of academic software would be common methods of instruction, followed by online tools and collaboration. However, challenging the distraction of technology in the classroom is dependent on how engaging the class is and if the technology is used in a meaningful way. Although, examining whether the students' time on task, their progress and success in completing the tasks, and the duration and frequency of the teachers' and students' talk was different in different physical configurations. The research focused on any changes in students' behaviors and overall participation in the tasks, as well as any influence on the groups' outcomes, which resulted from their collaboration (Mercier, Higgins and Joyce-Gibbons, 2016).

A recent study by Lerdpornkulrat, Koul, and Poondej (2018) strengthens the understanding of ways in which a "connected learning environment" contributes to student intention to persist in college which is particularly critical for first-year students. During the programming, planning and design phases of the learning environment, design professionals tend to focus on physical elements – the organization of areas and the building systems. But this approach minimizes how the physical environment shapes students (Lippman, 2015). The educational environment must provide opportunities for everyone to learn. The physical environment, spatial design, and information technologies must be planned to support a variety of collaboration spaces. Thoughtfully designed spaces help create optimal experiences for learning. Indeed, the learning landscape is changing rapidly as technology enables us to learn and study across time and space in new ways, (Nordquist and Laing, 2014). Traditional classroom spaces become unnecessary as the lecture can be viewed virtually at another time and location Classrooms have to be redesigned to meet the objective of the course. Libraries held books and journals that are now available 24-7 on the Internet. Re-purposed libraries physical space are now seen as collaborative learning spaces. Moreover, campus and university building design needs to give more consideration to the social underpinnings of learning. Providing welcoming and flexible spaces, including informal meeting spaces should be seen as part of the support to learning through developing a broader learning landscape (Temple, 2008).

Park and Choi (2014) wrote that education institutions should pay more attention to the educational impact that classroom design has on students, and make healthy learning spaces a priority. A healthy learning space for educators most familiar with traditional classroom spaces creates a challenge or stress in navigating different teaching spaces. New teaching and learning methodologies should be made known to educators to maximize the use of different spaces. More research is needed on the impact of active learning spaces related to both students and educators to enrich the design of future classrooms. Such designs suggested cooperative works with the fields of architecture, environmental psychology, and education would generate more dynamic approaches to develop new concepts of educational space. In addition, Park and Choi (2014) suggested a couple studies, the first study, should focus on instructors comfort level in the newly designed classroom that could positively or negatively impact the quality of teaching in the space. Secondly, compare the educational outcomes of active learning in traditional classrooms and newly designed classrooms. Moos and Azevedo (2009) found that few studies have examined differences in measurements of task performance. Task performance in the reviewed studies ranged from the correct number of Internet searches to performance scores on a sophisticated computer simulation. Both valid measures of learning outcomes, successfully searching the Internet is a different learning outcome from performance in a complex problem-solving activity with a computer simulation. Mercier, Higgins, and Joyce-Gibbons (2016) study found groups took different approaches to the task depending on the room configuration. Groups in traditional classrooms worked a little faster to complete tasks, while student-centered classrooms engaged in more conversation thus making slower progress. Students interpreted goals of the activities differently in the different classroom layouts, seeing traditional classrooms with a goal to get the answer correct to provide to the teacher while centered classrooms had higher levels of collaboration and talked about the activity. Forward-facing arrangement more closely matched the classroom layouts that the children were familiar with from their own schools, so they have "read" into this that the aim was task completion. Circular arrangement appeared more informal which influenced the way students interacted with each other and the teacher.

Brooks (2011) research has contributed significantly to the discussion, physical space alone can improve student learning even beyond students' abilities as measured by standardized test scores. Although, curricular revisions that utilize the redesign classroom need further research. However, limited research is addressing how formal learning spaces affect students' perceptions of their learning experience. As Lerdpornkulrat, Koul, and Poondej (2018) highlighted in their study the importance of strengthening mastery goal structures so that students may find value in their learning and affective dimensions of motivation.

While more collaborative spaces are designed, students need to master skills that allow students to work independently or with one another. Cooperative learning spaces may contract when the group comes together to discuss the project, then expand as individuals separate from one another to work on specific tasks. Separation might merely entail moving their seating position a few feet away from the group space or moving into another space altogether (Lippman, 2015). As Nordquist and Laing (2014) suggested, physical learning spaces must be reimaged for new modes of social and interactive learning that will blend and optimize physical settings and technologically enabled experiences. New learning experiences need to be created at every scale of the learning institution – the classroom, the building, and the campus. We need to build not only new spaces but better instructional methods and processes for researching and effectively briefing design. Riddle and Souter (2012) discovered that creating learning commons, a flagship project with an indoor/outdoor area designed with student study needs in mind created equity of space. The space included group learning zone with banquette seating to create a café-style ambiance, an open area with chairs and tables that can quickly be reorganized for the group and private study, and an outdoor learning terrace with weather-proofed seating and a timber deck. The design emphasizes flexibility, comfort and an appropriate blend of technologies with wireless Internet available in the outdoor seating area. Indoors, the group learning areas and lockers provide students with power for laptops and mobile devices. Other spaces developed include small study and chat or “eddy spaces.” All areas include provisions for amenities for students with disabilities and extended hours. Temple (2008) speculated new learning spaces, with student-focused design features can encourage new ideas and creativity. Additionally, more research is needed to understand how classroom spaces create more productive higher education communities and its connections with learning and research. As Zhang and Zhou (2017) suggested, future classrooms should include purpose, openness, intelligence, and interactivity. The future classroom is a creative learning space where the comfort of the learning environment will directly affect the students’ learning success.

Students’ Perception on Classroom Environment

Researchers have conducted limited research to identify the relationship of interactions using technology in the classroom. Active learning, engagement, and interaction in the classroom are current educational strategies that challenge instructors to engage the use of computers into the curriculum effectively.

An issue Kreijns, Kirschner and Jachems (2003) discovered in their research that social interaction is a prerequisite for collaboration and collaborative learning. Social relationships, group cohesion, and trust define the effective structure in the social space that in turn reinforces social interaction. Social interaction builds a community of affiliation when group members perceive that they are mutually dependent on each other to successfully accomplish the work and learn meaningful tasks that require the students to talk with each other. Impression formation is a social cognitive process where individuating impressions of the others in a group are developed, i.e. “getting to know one another.” Pekrun, Goetz, and Titz (2002) theoretically assumed that students experience a rich diversity of emotions in academic settings. Academic learning and achievement are among the most important topics across the lifespan in our society today, especially because educational and professional careers, social relations and the allocation of many kinds of resources are largely dependent on individual achievement. Individual achievement or a goal of “wanting to do well” also can be an essential part of a learning goal framework as Grant and Dweck (2003) discovered in their research. A student with a learning goal may care very much about doing well on a task, but perhaps for different reasons (i.e., to maximize learning, as an indicator of successful learning, or for instrumental reasons.) To further explore different reasons to achieve goals, Dabbagh and Fake (2107) studied college students’ perceptions of the personal learning environment (PLE) and what digital tools they use to support learning. Dabbagh and Fake (2107) found that the goal of the student shifts from a recipient of information and participator in a learning experience that is designed and facilitated by the instructor to a collector, organizer, and designer of one’s own learning experiences.

Although a need still exists to understand the problem Bradley and Lomicka (2000) identified regarding the perception of students that indicated computer labs offered a more relaxed environment that students do not take seriously compared to a traditional classroom. Again, the question remains regarding the purpose of coming to the lab as a class, since it is not apparent why the completion of these activities should require their presence within the four walls of the computer-enhanced classroom. Kreijns, Kirschner, and Jachems (2003) suggested building interactivity into web-based computer-supported collaborative learning environments that included support for collaborative learning does not mean that social interaction will occur. In other words, just putting together a group to have discussions and labeling it “café” or “lobby” does not increase interaction. More importantly, the focus needs to be on types of interactivity enabled educational techniques that stimulate collaboration and the development of a learning community to occur but does not cause it. As Pekrun, Goetz and Titz (2002) found environments may be inferred from our theoretical perspective although, Grant and Dweck (2003) suggested “task goals” and “mastery goals” do not put an explicit emphasis on learning. Therefore, the importance and desire to learn may be similar or different from the desire to master challenges. An example of measuring two forms of learning goals: explicit challenge-mastery comment is “I strive to learn and improve in my courses constantly.” Another example of explicit challenge-mastery is “It is imperative to me to feel that my coursework offers me real challenges (Grant and Dweck, 2003).”

Clark (2012) suggested a broad scope of further research that links the goals and practices of formative assessment to the actualization of student regulated learning characteristics and strategies. This is not limited to how teachers design the learning environment, model safety norms, and prepare for the effective use of formative assessments. Student regulated learning as Dabbagh and Fake (2107) described personal learning environments (PLE) are increasingly being discussed and described as new generation learning environments that embody Web 2.0 characteristics of openness, personalization, collaboration, social networking, social presence, and user-generated content.

A possible solution discovered by Bradley and Lomicka (2000) is that learner interaction in the computer-enhanced environment is not inherently communicative; instructors and educators should carefully consider the issue of task design by rethinking the goals of activities which merely “get information” without putting it to use. Although, Kreijns, Kirschner, and Jachems (2003) described the efficacy of collaborative learning as social interaction. The lack of social interaction is a factor that caused the negative effectiveness of collaborative learning. Lack of social interaction is due to the assumption social interaction will automatically occur because the environment permits it. The future design of environments that solely support and guide social interaction toward critical thinking, argumentation, or socially constructing meaning needs to be part of the discussion designing classroom. As Sproull & Faraj (1997) state, “People on the net are not only solitary information processors but also social beings. They are not only looking for information; they are also looking for affiliation, support, and affirmation.

Pekrun, Goetz, and Titz (2002) findings imply that academic emotions are closely tied to students’ self-appraisals of competence and control in the academic domain, to the values and goals they attach to learning and achievement, and to classroom instruction and social environments affecting control, values, and goals. Implications for prevention, therapy, and an emotion-oriented design of educational environments can be deduced from the importance of these appraisals. Again, Grant and Dweck (2003) found that learning goals do exert a positive influence on both intrinsic motivation and performance when individuals encounter prolonged challenge or setbacks. Performance goals that are focused on validating ability can have beneficial effects on performance when individuals are meeting with success; these same goals can predict impaired motivation and performance after setbacks. The goal of the course needs to keep in mind the objectives of who, what, when, where and how and keeping the end in mind.

Summary

In conclusion, the review of the literature strongly supports further exploration into student's perception of engagement and interactions in a computer lab classroom. As recent research by Gibbs and Taylor (2016) suggested, students often learn in unintentional ways regardless of motivation, engagement or ability to identify constructive feedback. However, Carless (2006) pointed out that interactions have been unexplored regarding the level of purpose, especially in a computer lab classroom. The purpose of this study explores students' perception of engagement and interaction related to self-efficacy in a computer lab environment. Therefore, as educational institutions face the challenges of creating learning spaces that encourage engagement and interaction where student learning happens as more and more students sit behind a screen.

Intellectual self-efficacy describes the learner's ability to confidently understand or apply a skill gained from experience or education; Further research needs to explore how the environment affects the student. In addition, self-efficacy in the computer lab classroom could potentially increase the students' satisfaction, retention, and completion of the course. This research study is an attempt to explore how a learner's intellectual self-efficacy is affected by interactions in a computer lab classroom. In Chapter Three, a detailed description of the convergent parallel mixed methods research quantified and described students' perception of engagement and interactions in a computer lab classroom.

CHAPTER THREE: METHODS

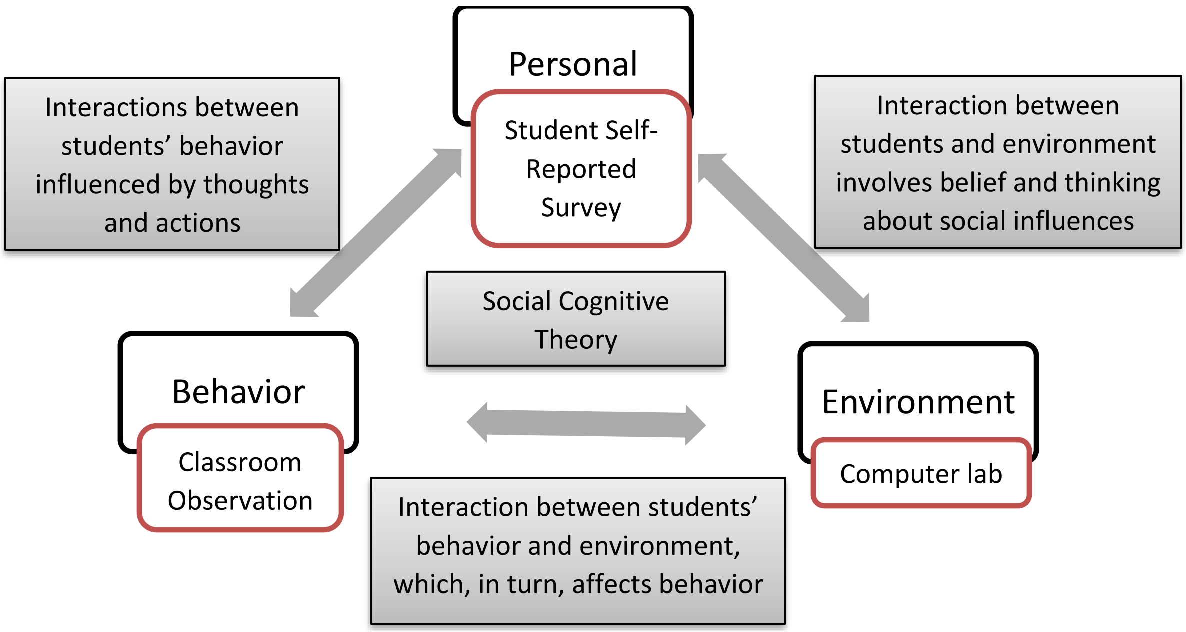
The purpose of a convergent parallel mixed methods design is to collect both quantitative and qualitative data at the same time, merge the data, and use the results to explore students' perception in a computer lab classroom. A simple rationale for this design is that one data strand provides strength to offset the weaknesses of the other data strand. Therefore, a more detailed explanation of a research question results from collecting both quantitative and qualitative data (Creswell & Plano Clark, 2011). This chapter includes a detailed description of a convergent parallel study design that explored students' perceptions of engagement and interaction related to self-efficacy in computer lab classrooms. Results of both sets of data will compare the findings to either confirm or reject students' perception of engagement and interaction while sitting behind the computer screen. An assumption is that each strand of data will provide different types of information (Creswell & Plano Clark, 2011). Triangulation of both the quantitative and qualitative data will strengthen the findings because multiple sources provide validity to the study. The following will be addressed in this chapter:

- Review of purpose statement;
- Description of research design, including research questions, site descriptions, recruitment strategies and participant demographics; and
- Description of data sources, data collection methods, data analysis procedures and coherence of data that strengthens the findings.

Purpose Statement

The intent of this study is to understand students' perception of engagement and behaviors in the context of computer lab classrooms arranged in different configurations. While active participation in the classroom informally evaluates what the learner knows prior, during or after a lesson, one method of engagement and interaction while students sit at the computers will be studied for this research. To further explain the phenomena, students were asked to reply honestly and openly about the configuration of the classroom related to engagement and feedback while sitting behind the screen. In addition, a Midwestern College of Business department is interested in the study as the computer lab classrooms will be redesigned and renovated during the summer of 2019. Purposeful sampling involved the selection of a group of students that would have experience in a computer lab classroom (Creswell & Plano Clark, 2011). Furthermore, a purposeful sampling of one department within the college provides insights for other departments of the college that utilize computer lab classrooms which have inspired my research questions. In this study, I will investigate classroom engagement and feedback measured by interactions in a computer lab classroom that effects the students' intellectual self-efficacy.

The study seeks to test Bandura and Wood's (1989) social cognitive theory and Bandura's (1977) self-efficacy theory in that self-efficacy is a feeling that can be influenced by environment, behaviors and personal beliefs. Questions in the survey will assess to what extent students' perceive interactions and engagement in computer lab classroom based on how the different configuration of the rooms affects a students' self-efficacy. In the following illustration (See Figure 1) the diagram overlaps the question sets related to the social cognitive theory and the data collection instruments that will be used in this study. The gray boxes in the diagram describe the three areas related to social cognitive theory and the types of interactions within each domain. The inner boxes illustrate the method of data collection to test Bandura's (1989) social cognitive theory further. In addition, the diagram provides a visual representation of the triangulation of the data.



Bandura, A. (1989). Human Agency in Social Cognitive Theory (Vol. 44).

Figure 1. Social Cognitive Theory Research Diagram

The next section further describes the design of the study and the research questions to explore students' perception of engagement and feedback in computer lab classrooms.

Research Design

A convergent parallel mixed methods case study approach will be used simultaneously to collect quantitative and qualitative data. In this approach, data will be collected using a survey and through observational methods. The four-step process of collecting data includes capturing both quantitative and qualitative data within three different computer labs. Quantitative data will be collected via an online survey and an observational checklist used by the researcher to record specific interactions and behaviors during classroom observations. At the same time, qualitative data collected online through open-ended questions and thick description of observations will be analyzed by theme. The next step will involve the analysis of quantitative data using descriptive statistics, inferential statistics and effect size. The third step after data analysis will merge the two sets of results to compare or contrast and/or collect the results to be displayed in a table. In addition, differences within one set of results based on the interactions will be examined and organized to conduct further analyses of the data. Creswell and Plano Clark (2011) confirmed that a mixed methods study provides valuable insight to identify key variables based on the students' perception of interaction in the classroom. Also, a convergent parallel mixed-methods design provides a theoretical lens that strengthens the validity and reliability of the study. A diagram of the study (See Figure 2) illustrates the method used to gather data.

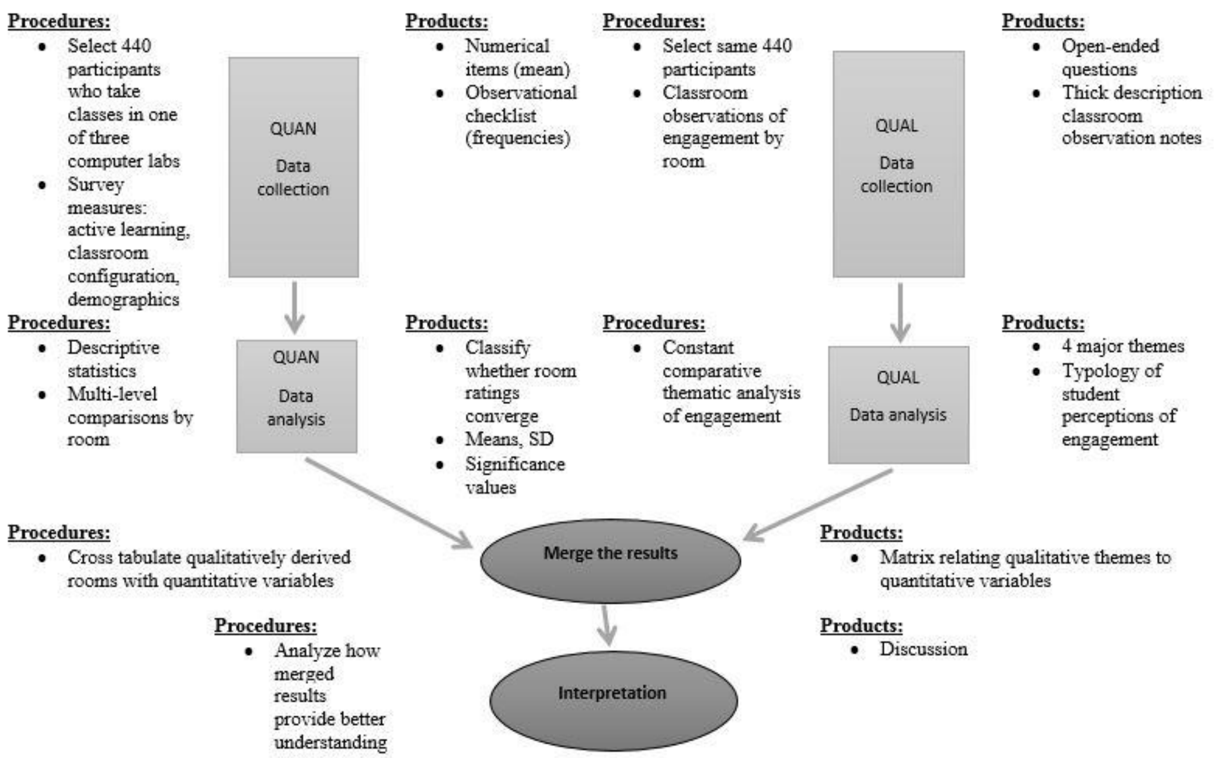


Figure 2. Diagram of Convergent Design

I have chosen to use a convergent parallel mixed method because it will allow both types of data to be collected at the same time. Also, this type of design makes sense because each type of data collected can be analyzed separately and independently, which will provide a baseline of data from the students' perspective to address the research question.

Research Questions

The topic of engagement in computer lab design warrants attention for further research with an emphasis on students' self-efficacy since schools continue to renovate spaces. Architecture for schools possesses a "hidden curriculum" by not understanding what affect the design or configuration of the classrooms has on learning (Park & Choi, 2014). In this study, I will investigate three areas of concern regarding students' perception in the computer lab classroom: engagement, interactions, and self-efficacy. As seen in Table 1, the research questions below guided my work:

Table 1
Research Questions and Method

Research Question	Method
1. What are students' perception of the configuration of computers in the classroom?	An online survey using a Likert scale measuring configuration of computer lab classroom. Observational checklist of on-task activity.
2. What are the differences in students' engagement and interactions based on the configuration of computers in the classroom?	An online survey using a Likert scale measuring level of engagement and interactions in a computer lab classroom. Observational field notes of interactions.
3. What are students' perceptions of engagement and self-efficacy based on the configuration of computers in the classroom?	Open-ended questions. A thick description of classroom observing behaviors related to engagement in three computer lab classrooms (Room A, B, and C).

The research questions will provide insight into computer classroom design that engages students in the learning space, as schools renovate classrooms or design interactive learning spaces. In the following section, a description of the site to be included in the research will provide a picture of a typical computer classroom design.

Description of the Site

Several researchers noted, “Scientific research shows how the physical environment influences student achievement” (Cheryan, Ziegler, Plaut, and Meltzoff, 2014, p. 4). My study is modeled in part by the recommendations of Cheryan, Ziegler, Plaut, and Meltzoff (2014) to explore the differences in three configured computer classrooms with instructors teaching the same course. One of the university’s elective core curriculum courses, an Introductory to Business and Computer Applications (IBCA) that enrolled approximately 575 undergraduates into twelve sections with nine adjunct instructors taught in the computer classrooms became the focus of the study. Several majors require IBCA to be completed for the undergraduate degree. The course is delivered in the business building at the Midwestern College of Business. The business building was built in 1979 with the traditional rectangular lecture-style classroom. Classrooms were designed for individual desks that later became electronic typing rooms. In 2004, technology-enhanced renovations were implemented in several classrooms to include projectors and desktop computers in a traditional classroom. Traditional classrooms could seat more than 50 students, but with desktop computers, enrollment in the section is limited to 48 students due to the configuration of computers in the classroom. One of the three computer lab classrooms is randomly assigned to one of the nine adjunct faculties to teach in each semester. In Figure 3 images of the classroom, configuration illustrate the three computer lab classrooms arranged differently by rows of computers. As displayed in Figure 3, each room consists of rows; the differences are the placement of the computers. In room A and C students in the middle rows face each other, with the computer screen between students which limits students’ ability to see each other. Additionally, students seated in the middle rows turn their heads to see the projection screen and instructor.

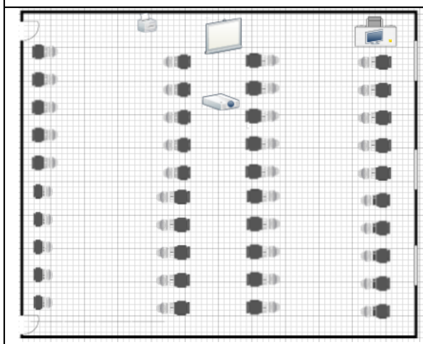
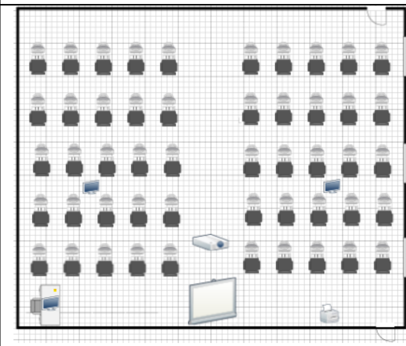
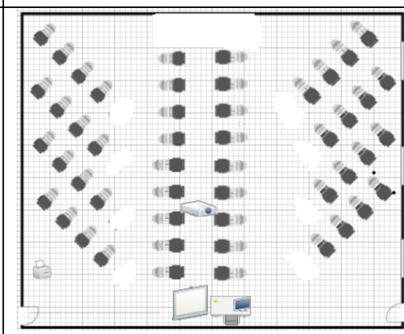
Room A Instructor's computer station in the corner	Room B Instructor's computer station in the corner	Room C Instructor's computer station in the middle
		

Figure 3. Diagram of Classroom Configurations for Study

Each computer lab has 40-50 computers; an instructor's computer station is located usually in a corner except for room 3. The illustration does not show how the computers are placed on tables (not individual desks) to accommodate the number of computers needed within the classroom space. An instructor's ability to see all of the students is limited because the students' faces are usually turned to the screen; students also cannot see most other students in the room or the instructor without looking over or around the computer screen.

In Room A (vertical rows), ten computers are lined up in four rows (40 seats) with students facing the wall or another row of students, with the instructor's station located in the corner. Room B (horizontal rows) has five rows of five computers (50 seats) on each table, divided by a walkway in the center of the room. The room is equipped with a projector at the front, and two television screens are located midway in the room for students in the back rows to see the instructor's computer screen. Students face the instructor sitting in front of the computer screens. Room C (vertical and slanted rows) has four computers lined up in four angled rows with students facing the front of the room on each side and 18 computers in a row, facing each other in the center of the room. The computers in the middle of the room have three power poles that obstruct the view for some students and the instructor. The instructor's station is located in the middle of the room with the rows of computers facing each other. Again, direct eye contact with the instructor or the projection screen at the front of the room is limited by a 24 inch computer screen that creates a barrier. Also, depending on location in the middle rows students must turn their heads to look at the projector or instructor at the front of the room.

Target Population

The university offers several core curriculum courses, and IBCA is required for students with business majors. Each semester, enrollment is approximately 575 undergraduate students taught by nine to twelve professors and adjunct faculty. The majority of students enrolled in IBCA are first-year students or sophomores with a few juniors, seniors and non-traditional students the course. As displayed below in Table 2 students self-enroll in each section based on their personal schedule and availability of the section, which describes the range of diversity of students per section.

Table 2
Sample Population Characteristics

Age	Ranges from 18-65
Gender	Male, Female and Self-identified
Race	White, Black, Hispanic/Latinx, Asian, Other
Majors	Potential of 190 majors

In addition, the diversity of faculty teaching the course range in age (30-70), consist of three females and five males but are predominately white race instructors. Educational background varies, including the number of years teaching in a traditional classroom versus a computer lab classroom.

As the department in the Midwestern College of Business seeks to gather information regarding the reconfiguration of the computer classroom for summer renovations, this study provided an understanding of the importance of computer classroom design. Therefore, each instructor of an IBCA course taught in a computer lab classroom will be asked to participate in the study. Instructors will be given a link to the online Qualtrics survey in Blackboard. The instructors informed students that participated in the study will be without compensation or extra credit, and students will not be coerced to share personal reflections on methods of engagement and feedback in the computer lab classroom. Each participant in the study must be an active Midwestern University student, at least 18, and enrolled in the Introductory to Business and Computer Applications (IBCA) course. Students under the age of 18 and not enrolled in IBCA will be excluded from the study. The data will be collected anonymously and will take about 10-15 minutes to complete via an online survey. Faculty will be reminded to encourage students to complete the survey honestly and thoroughly to provide insights into students' perceptions of classroom designs.

Recruitment Strategies

Approximately 440 students were invited to participate in the study; based on response rates, two follow-up reminder emails will be sent to instructors. Therefore, based on the population of students enrolled in IBCA, descriptive statistics of participants in the study. Demographic statistics for *(n* =170) responses obtained on the survey shown in Table 3, asked students to provide information on: current year; gender; preferred technology devices to use in the classroom; access to technology in high school; and the classroom number. Three students gave "not in this building" response, which meant removing all three responses from the data set. Question 3 asked students about a preference of technology devices to gain insight for comparison that supports the research. In addition, question 4 asked students about technology availability in high school to gain insight into students' experiences that support the findings.

The distribution of findings reflects the results from Room A (*n*=69), Room B (*n*=26), and Room C (*n*=72). Although, Room B had an unequal sample size the results provide insights for comparison of traditional classroom design (horizontal rows) with desktop computers to the other computer lab classroom. Students that responds, not being in the same building (*n*=3) are excluded from the results.

The following Table 3 provides the population and sample size summary of students' characteristics based on the results of the survey.

Table 3
Summary of Students Characteristics

Characteristics		*N*	*n*	%
Current Grade Level				
	Freshmen	189	92	54.1
	Sophomore	166	54	31.8
	Junior	54	21	12.4
	Senior	16	3	1.7
Gender				
	Male	270	103	60.6
	Female	155	65	38.2
	Other	15	2	1.2
Race				
	White	315	121	71.2
	Black or African	32	28	16.5
	Asian	19	10	5.8
	Other	12	11	6.5
Classroom				
	Room A	160	69	40.6
	Room B	80	26	15.3
	Room C	200	72	42.4
	Not in this building		3	1.7

Note. Population. *N*=440, Sample size. *n*=170

Participants. Purposeful sampling was used to explore to what extent the computer lab classroom configuration affects engagement and feedback related to a student's self-efficacy. Purposeful sampling as defined by Maxwell (2009) is "particular settings, persons, or events are deliberately selected for the important information they can provide that cannot be gotten as well from other choices" (p. 87). The purposeful selection of 440 undergraduate students enrolled in an Introductory Business Computer Applications (IBCA) at a Midwestern College of Business will be invited to participate in the study. The following Table 4 displays number of participants by room location with coded instructors. Two instructors had *n*=80 students and the seven other instructors had *n*=40 students. In Table 4 shown below, the researcher notes the unbalanced sample size of 80 students for room B, but data was collected due to the interest of the research by the business department in the college for future classroom renovations.

Table 4
Cluster Sampling by Room and Instructors

Location		*N*	%
Room A			
	Instructor C	80	50.0
	Instructor D	40	25.0
	Instructor I	40	25.0
Room B			
	Instructor F	80	100.0
Room C			
	Instructor A	40	20.0
	Instructor B	40	20.0
	Instructor E	40	20.0
	Instructor G	40	20.0
	Instructor H	40	20.0

Note. Room A. *n*=160, Room B. *n*=80, Room C. *n*=200

Quantitative and qualitative data collected from the online survey will provide one strand of data to be merged with the qualitative data. Although the qualitative responses to the open-ended questions regarding students' description of engagement and what helped or hindered interactions were voluntary, all responses were included in the analysis. Responses to describe what helped or hindered students interaction in the classroom, 152 out of 170 which reflects a high response rate 89% participation to the question. While the response rate 101 out of 170 to define engagement in the classroom shows a lower percentage (59%) participation in the question still provided an adequate response rate. In addition, a research assistant and the researcher observed the three computer lab classrooms twice during the first thirty minutes of each class, for ten hours of classroom observation. The classroom observations were completed within the same week due to the application assignment plus several sections met two or three times a week, with the exception of the weekly night classes. During the classroom observation, the instructors presented materials on the same topic and application assignment. The purpose of the observation was to capture and quantify “on task” or “off task” behaviors with the qualitative classroom observational field notes.

Sampling Strategies

A sense of community in classrooms develops through engagement and feedback; this research will focus on three different configured computer lab classrooms. Therefore, purposeful sampling will be applied to explain the concept of engagement behind the computer screens further. Purposeful sampling allows the researcher to intentionally select the participants based on experiences in the computer lab classrooms (J. W. Creswell & Plano Clark, 2011).

Also, to increase the validity of the quantitative and qualitative findings in the convergent parallel mixed methods, a triangulation analysis of the qualitative strand of data provides information that supports cluster sampling by classroom (Room A, B, and C). Cluster sampling allows the researcher to examine the target population for the study, 440 students, clustered by classrooms to explain results following a collection of data to compare interaction response and observations in the classrooms during lecture days and application assignment days. (Hesse-Biber, 2010).

A common reason for conducting a parallel design is to compare results; instead, I will utilize the triangulated data method in the convergent analysis process to gain insight into the phenomenon of engagement in a computer lab classroom. For example, the closed ended and open-ened respones from the survey from each of the three classrooms e.g, Room A, Room B and Room C provides comparison of perspective from students. A second type of triangulation compares survey responses with classroom observations with closed ended responses. The triangulation of the data strengthens the validity of the results with consistency across the data sources (Creswell & Plano Clark, 2011).

Procedures

On the consent form, participants were asked to voluntarily participate in an online survey distributed through Qualtrics to all students enrolled in IBCA, taught in three different computer lab classrooms. In addition, open-ended questions captured qualitative responses as the researcher, and graduate assistant observed classroom interactions on two different days. Observations will take place once during traditional lecture days followed up by observation of interactions during assignment application days. A different code is generated for each section of the class, and the instructor, based on the room. Two classrooms observations for each section provided 22 qualitative data findings. The researcher observed classroom interactions based on the interaction checklist and collected a thick description of activities on lecture days and assignment application days. Since the study was conducted at the same time, the quantitative data and qualitative data are independent but will be mixed after analysis to report the findings. The next section describes the methods for collecting the data.

Data Collection Methods

. In the first step, both quantitative and qualitative data were collected following undergraduate students' mid-term participation in an Introductory to Business and Computer Application course (IBCA) to test Bandura's (1977, 1989) social cognitive and self-efficacy theory.. In the second step, an analysis of both independent data strands will explain aspects of interaction related to quantitative results. The next section further describes the quantitative and qualitative methods, instruments and the study that identifies the relationship between engagement and interaction in computer lab classrooms.

Quantitative Strand

Data Collection. During the quantitative collection, an online survey using Qualtrics was administered to students (n=440) enrolled in the introductory to business and computer applications course (IBCA) mid-term in the semester. The quantitative data provides a baseline of student perceptions of engagement and feedback towards intellectual self-efficacy in computer lab classrooms. In addition, during classroom observations, a checklist will quantify types of interactions related to engagement and feedback during lecture days and application assignment days. The survey instrument was self-developed around two individual research projects suggesting further research into classroom configurations and students' engagement and interactions (McVay, Murphy, & Wook Yoon, 2008; Pintrich & De Groot, 1990; Siau, Sheng, & Nah, 2006). The survey items focus on two main components rated by a 5-point Likert type scales to address the research questions related to classroom configuration, engagement in the classroom, and self-efficacy as described further in the instrument.

Description of the instrument. The anonymous survey was administered online with instructors of each section of IBCA providing a uniform resource locator (URL) from Qualtrics. Active participants enrolled in IBCA for the spring term 2018 were recruited through the learning management system (Blackboard). The online survey was available in Qualtrics for two weeks, after eight weeks of instruction in the classroom. The first five questions of the survey sought to capture student demographics and previous experience in computer lab classrooms. Questions labeled 1-28 (Appendix A) seek to address the research question regarding classroom configuration based on classroom configuration/technology and the seven principles survey (McVay et al., 2008). At the same time, classroom observations utilized a checklist (Appendix B) to capture types of interactions to be quantified and merged with student responses.

The response options for the online survey questions 1 to 28 (Appendix A) range from strongly agree (SA), agree (A), neither agree nor disagree, (N), disagree (D), and strongly disagree (SD). The question sets used in the survey are part of Siau, Sheng, & Nah, (2006) research from the *Use of Classroom Response System to Enhance Classroom Interactivity*, in which neither agree nor disagree, (N), was included in the Likert scale and used to compare the data. One concern in allowing a neutral, mid-point response is that the participants might feel obligated to give an answer for the items in the scale but are undecided or have run out time to think about the question. However, the pros of keeping the neutral, midpoint are much more because it is a typical response for participants to be in the middle for some actions or behaviors.

Data Analysis. Descriptive statistics of demographics are included in the findings. A t-test analysis of questions was also conducted (McVay et al., 2008). Descriptive statistics from the survey data were reviewed, and independent t-tests were calculated for each variable to examine differences among the variables (Appendices). Qualtiative responses from open-ended questions were analyzed using a direct content analysis approach to identify emergent themes (Maxwell, 2009).

Students in each section, identified only by rooms, will be compared with two other rooms; therefore, a multi-level data analysis approach will be used as an appropriate comparison methodology. According to research conducted by Siau et al. (2006), the reliability of the question set addressing interaction returned a Cronbach’s alpha coefficient in the pre-test for interactivity is .86 with class interaction at .90. The post-test Cronbach’s alpha coefficient for interactivity is .91 within class interaction at .94, which indicates the instruments are highly reliable. Therefore, indicating that classroom interactions or engagement strategies influence pedagogy. Subsequently, instructors continuously initiate methods or technology tools to increase student engagement in the classroom.

However, given that the participant's sample size varied by rooms, Room A (n=69), Room B (n=26) and Room C (n=72), therefore, two different statistical analysis were run for the reliability of means, the Welch's T-test (See Table 5) and Levene's test. The Welch's T-test was used to test the hypothesis that both rooms have equal means. In other words, the equality of means within the difference of participants by room indicated the interaction by room had significance results.

Table 3
Equality Means Welch's T-test

Robust Tests of Equality of Means

Sum score		Statistic[a]	df1	df2	Sig.
Room configuration	Welch	1.861	2	83.104	.162
Interaction by room	Welch	5.658	2	81.416	.005
Self-perceptions by room	Welch	1.825	2	79.562	.168

Note: a Asymptotically F distributed.

The Levene's test determined the assumption of homogeneity of variance. The Levene's test compares all groups, as one group was unequal to eliminate biased findings. To test the null hypothesis, the *F*-test indicates a violation of the assumption when the *p*-value was less the .05. The Levene's test resulted in a p = .784 indicating that there are equal variances in scores. Since this result is more significant than p =.05, then the assumption for homogeneity of variances is supported. Therefore, the results of the independent samples *t*-test mean score for students are based on two rooms, Room A and C. The selection of Room A and Room C for analysis was based on homogeneity of variance in participation by Room A, *n*=69 and Room C, *n*=72, as participation by Room B, n=26 could not be computed to eliminate biased findings.

To examine students' perceptions of interaction and engagement in a computer lab classroom accurately and systematically, conceptual definitions from the prior literature were reviewed by Siau, Sheng and Fui-Hoon Nah (2006). Siau, Sheng and Fui-Hoon Nah (2006) developed ten items to measure interactivity. A reliability test of the instrument was performed by Siau, Sheng and Fui-Hoon Nah (2006) during their study that suggested the instruments are highly reliable based on Cronbach's alpha coefficient interactivity at the individual level is 0.86 which exceeds the threshold of 0.70. The independent variable by room and the dependent variable scores were based on a Likert scale. The 5- point Likert scale was ordinal data that is continuous (Strongly Agree, Agree, Neither Agree or Disagree, Disagree, Strongly Disagree). Using a nominal, dichotomous independent variable with a continuous dependent variable, the best fit for analysis of the data would be an independent sample T-test. An independent T-test categorized by question sets tested statistical significance (See Appendix D). In the following Table 6 different sampling sizes compared Room A and C by question set.

Table 6
Group Statistics by Room

Data Set Groups Sum Score	What classroom do you meet in?	N	Mean	Std. Deviation
Likert room configuration	A	69	21.86	6.625
	C	72	23.22	7.044
Likert room interaction	A	69	22.09	7.245
	C	72	23.47	6.298
Likert room self-perceptions	A	69	12.54	4.262
	C	72	13.58	4.543

The average score for configuration in Room A, 21.86 likert scale (*SD* = 6.625), lower than Room B, 23.33 (*SD*= 7.044). Although, the average score for interaction in Room A, 22.09 likert scale (*SD* =7.45) indicated a difference in Room C, 23.47 (*SD* = 6.298). The average self-perception score for Room A, 12.54 likert scale (SD = 4.262) is lower than Room C, 13.58 (SD = 4.543). In addition, the study included qualitative research described in the next section.

Qualitative Strand

Qualitative Research Design. As the researcher, classroom observation of interactions were included in the findings utilizing a checklist of types of engagement and feedback plus a thick description of field notes. A graduate assistant assisted in capturing the interactions as a method of validity. Two open-ended questions included in the online survey sought to gain insight into individual responses regarding engagement in the classroom. In the following section, the observation protocol has been described for this study.

Observation Protocol Development. Students were informed that the observation was for research, no personal identification will be associated with the field notes or recording of interactions in the class. During the qualitative collection of classroom observations, the researcher and graduate assistant utilized a checklist (Appendix B). The collection of interactions developed into themes based on the thick description of field notes during lectured topic and application assignment days. Themes were compared to the open-ended responses in the online survey.

Data Collection. Students were observed twice in their classroom with the researcher and graduate assistant capturing frequencies of interactions based on the checklist (Appendix B) and overall classroom activities. The student engagement classroom observation guide and the key to engagement codes are a resource from Warring's online learning community (See Appendix B). Different types of interactions were charted during the first thirty minutes of classroom observation. On task or off task interactions were recorded for fifteen minutes on the right side of the room, then the left of the room.

Classroom observation field notes were transcribed for reference in regards to the type of classroom activity that encouraged or discouraged engagement and feedback in the computer lab. In addition, the open-ended question included in the online survey provided insight into the development of thematic codes from the online survey. The researchers interviewed instructors to clarify potential thematically driven data responses. Instructors agreed with coded themes of responses from the online survey and observations in the classroom.

Qualitative Analysis. The content of the open-ended question were developed to further address the research question to what extent does sitting behind a computer screen impact a students' sense of self-efficacy. The purpose of the qualitative phase was to explain the comparison of student perceptions related to the quantitative survey (John W. Creswell, 2008). The open-ended question sought to clarify how different classroom configurations engage and provided feedback to the students. Text entered into the open-ended response questions was imported into a computer-assisted qualitative analysis software (QDA Miner Lite) to code the findings. Additional thick descriptive field notes were analyzed in accordance with the open-ended responses and classroom observations. Analysis of the data provided insight into the behaviors of engagement and feedback in computer lab classrooms. Similarly, the relationship between sitting behind a computer screen and intellectual self-efficacy included descriptions of the classroom setting that either helped or hindered the students' ability to interact in the class. In addition, students defined what being engaged in a computer lab classroom meant and how learning was enhanced or not enhanced within the computer labs. A multi-level analysis of questions in the survey were treated as independent variables while classrooms were identified as dependent variables. A research assistant and I reviewed and coded the transcripts of 10 days of classroom observations. Observations were collected by dividing the room into two areas, the right and left side, recording behaviors, interactions, engagement for fifteen minutes per side or thirty minutes total per classroom observation. Each classroom was observed twice in the same week, unless the class met once a week, with a total observational time in each section of the IBCA course classroom equaling one hour. During the observation, each instructor lectured, demonstrated and allowed students time to work on assignments during the different days of observation in the classroom. While the observation consisted of focusing on students' interaction, instructors in each section of the courses had similar instructional approaches to the application assignments. Each application assignment was demonstrated by the instructor, and students had opportunities to ask questions during class plus time to complete assignments while sitting at the computer screen. Again, the focus of the study was not on the instructional strategies of instructors but students perception of engagement behind the computer screen. A list of the observational themes by room contributed to the understanding of classroom configuration in comparison by rooms. Several themes emerged from the classroom observation including, ability to see, distractions and interactions.

The following field notes from the researcher first describes students' ability to see in each of the computer lab classrooms. In classroom A (vertical rows), computers are aligned in vertical rows and the instructor stands in the front corner of the room. The instructor demonstrated the application assignment on the projection screen. Student chairs are turned or pushed away from the desk to see the front of the room or projector screen. The chairs do not raise or lower and sit low to the floor. Student heads are turned, looking back and forth at the computer screen with difficulty seeing around students in rows aligned with room dimension. Classroom B (horizontal rows), computers are aligned in horizontal rows and the instructor stands in the front corner of the room. The room is hot, smells musty, chairs do not raise or lower and sit low to the floor. The instructor demonstrates the application assignment on the projector screen and the two displays in the middle of the room. In classroom C (vertical and slanted rows), computers in the middle rows are vertically aligned with the room and the side rows are slanted in a v shape. The instructor desk is in front of the projection screen. Students in the middle rows turn their heads to look around peers and at demonstration of application. During the demonstration, students in the slant rows look up and can follow along on the screen. Students in all three rooms look over or around a 24 inch computer screens to see the projected screen. Students' heads are down, rarely looking up at the projected screen. The back rows in rooms arranged vertically or horizontally, students struggle to see the projection on the screen and struggle to hear the instructor while box fans try to cool down the rooms.

Additionally, the researcher noticed similar distractions in all three rooms (A, B and C) during the observations. A few students used personal laptops for a second screen to display application instructions, a couple students watched movies with closed caption and social media sites. Students in the back rows of each room used cell phones to text and take selfies during class. The researcher observation of interactions in the classroom included students in the front row of the three rooms (A, B and C) interacted with the instructor. Although students in room A and B, where the computers are aligned in horizontal or vertical rows had limited interactions with peers or the instructor. In Room C, students actively participated with peers and instructors. The observations provided insight into data not captured by the quantitative survey. Therefore, the triangulation of the data adds to the validity and reliability of the study.

Researcher Subjectivity

I have chosen to study self-efficacy in computer lab classrooms while observing students' interaction or reaction sitting in front of the computer screen. An example of the various behaviors may include: making no eye contact with the instructor; slouching, or looking only at the computer screen when asked to respond to a question. In teaching undergraduate courses, I have noticed that students seldom volunteer to answer questions, which leaves the instructor to call on students to actively participate in class. Bradley and Lomicka (2000) found that students' perception of the computer lab classroom offers a relaxed environment over traditional classrooms. In addition, the tasks completed in computer labs allow for independent work. Therefore, students lack the understanding of the purpose of sitting in the computer lab and actively engaging in class. "The computer-enhanced environment is not inherently communicative, instructors and educators should carefully consider the issue of task design by rethinking the goals of activities which simply 'get information' without putting it to use" (Bradley & Lomicka, 2000). For that reason, this study attempts to provide answers to how interactive response systems influence self-efficacy in a computer lab classroom, yet little research has addressed the issue related to classroom design, especially within computer lab classrooms.

Limitations

Potential instructional pedagogy could limit the study, such as the student's ability to engage or be provided feedback within the classroom. Other limitations included the selection of the purposeful group and voluntary participation of students to honestly and accurately respond to the online survey. The sampling size (n=440) will allow significance of reliable results mixed with qualitative observations of the classroom. Additional limitations include the timing of the study; students' perception of engagement and feedback after eight weeks of the course could require additional time to study. Thus prior classroom engagement could have set the stage for a culture of engagement following the next several weeks in class. In addition, the purposeful selection of the course (IBCA) covered the same assignments and topic for each section. Furthermore, instruction within the courses expected that each instructor utilized best practices of active learning within their course. Overall, the limitations of the study provided insight into explaining the connection of engagement and interactions in the computer lab classroom.

Assumptions

The following assumptions were cited for this study:

1. The instructor participation in the study adhered to the best practices of active learning in a traditional classroom.
2. The validity and reliability studies of each assessment applied to this study for comparison to mix the two strands of data.
3. The selected classrooms for the study were typical of computer lab configurations in educational environments.
4. During the voluntary participation of the online survey, participants answered honestly about the interactions related to the configuration of the computer lab classroom.

Delimitations

Creswell (2011) referred to delimitations as a process that narrows the scope of the study. For this research, the following delimitations were instituted:

1. The researcher identified 10 sections of an undergraduate Introductory to Business course at the university. The selection of the courses supported the research purpose of identifying configuration differences in computer labs.
2. The sections studied met during three different scheduled class times, which may have hindered generalization to other student schedules due to the length of the class. (Example: Monday, Wednesday and Friday classes meet for 50 minutes, Tuesday and

Wednesday classes meet for 1 hour and 15 minutes, and night course meets for 2 hours and 20 minutes).

3. The observations were limited to a lecture day and an application assignment day when students would have different types of interactions within the classroom.
4. The study focused on interactions during classroom questioning or during the application of assignments in the computer lab classroom.

Summary

This chapter described the convergent parallel mixed methods research design used for the study. The study discovered key variables to address the question of engagement and interactions that impacted a students' intellectual self-efficacy as referenced by Albert Bandura's Self-Efficacy Theory (1977). In Chapter Four, findings from the study provided answers to the research questions regarding what extent does engagement, interaction in computer lab classrooms affect self-efficacy.

Chapter Four: Findings

In this chapter, the findings are listed thematically, starting with students' perception of computer lab classrooms of students enrolled in IBCA courses. Secondly, students described the differences of interactions and engagement which included what helped or hindered their experience in the computer lab. Finally, the results demonstrate students' belief in knowing the content or self-efficacy while sitting behind the screen. The identified themes support the consensus view of students behind their computer screens.

Student perceptions of computer lab classrooms

Students' previous experience with technology and their preference of devices used in classrooms provided insight to the background of students experience with technology. With 54.1% of the students completing the survey were undergraduate freshmen, their previous experiences in high school might have contributed to their preferred devices to use in the classroom. When asked what types of devices they had access to use in high school, 38.8% of respondents reported using desktop computers provided by the school, see Table 7. Only 17.1% said their school provided mobile carts of laptops to be used in the classroom, but not take home while 22.4% reported that their school provided them with a laptop or tablet that they could take home and use all year. Just over 20% of respondents were allowed to use their own laptop at school, and only 1% had no device available either through school or at home.

Table 7
Technology Used in High School

Technology	*Number of students*	*%*
Desktop computers	66	38.8
Mobile laptop carts	29	17.1
1:1 Laptops or iPads	38	22.4
Personal laptops	35	20.6
Technology was not available	2	1.0

N= 170

Although when asked which device students preferred to use in class/for computer applications, 66.5% of students preferred using a desktop computer, see Table 8.

Table 8
Students Preference to Use

Technology	*Number of students*	*%*
Desktop computer	113	66.5
Laptop computer	53	31.2
Cell phone	2	1.2
Other	2	1.0

N= 220

In addition, 31.2% of students surveyed said that they preferred using a laptop computer while in the classroom to complete assignments. On the open response items, students mentioned ways they use computers for classwork including following along with the instructor, working independently or with peers to complete assignments in class. For example, one student said, “I like having a computer to work with as the professor goes through the class. It feels more comfortable.” Another student shared that “In the settings behind the computer we can each work independently after the professor explains the assignment.” Yet another student commented, “I like that we all have computers to sit at instead of carrying mine with me to class. We all work together but on separate screens.”

This data shows that although more schools are moving toward using portable devices that they or students’ families provide, many respondents still had experience using and preferred to use a desktop computer when given a choice between using a desktop or portable device. In other words, while students reported that they preferred to use desktop computers, their experience indicates a little more than 60.1% had access to mobile technology in high schools. Some of the qualitative data supports this as one student shared, “computers in class help a lot.”

Overall satisfaction of classroom configuration

The first eleven questions sought to identify what are students' perception of the configuration of computers in the classroom to address the research question. When asked whether students agree that overall, I am more satisfied with classroom configuration, students in all three rooms agreed, see Table 9. The average score for question addressing overall satisfaction of classroom configuration in Room A (vertical rows) mean 3.85 (*SD* = 0.809), Room B (horizontal rows) mean 4.0 (*SD*= 0.707) and Room C (vertical and slant rows) mean 3.79 (*SD*= 0.854). Results indicate a significant preference to Room B (*M* = 4.0, *SD* = .707).

Table 9
Classroom Configuration Average Agreement

What classroom do you meet in? (1=strongly disagree; 5=strongly agree)	Room A *M* (*SD*)	Room B *M* (*SD*)	Room C *M* (*SD*)
The classroom configuration allows for better contact with instructor	3.86 (.799)	3.84 (.815)	3.80 (.844)
The use of e-mail makes it easier to correspond with instructor	4.28 (.502)	4.46 (.380)	4.09 (.638)
The classroom configuration allows more contact with instructor	3.79 (.850)	3.84 (.815)	3.79 (.854)
The instructor's website and /or use of Blackboard makes it easier to correspond with instructor	4.30 (.491)	4.19 (.571)	3.94 (.746)
The classroom configuration allows us to critique problem solutions that students put on the projector screen	3.86 (.799)	3.69 (.924)	3.63 (.962)
The classroom configuration allows us to review the work of other teams more easily	3.59 (.994)	3.57 (1.00)	3.59 (.991)
Learning is easier when instructors use multiple technologies simultaneously (Projector, whiteboard, overhead, shared screens)	3.65 (.953)	3.92 (.761)	3.77 (.864)
Detailed or complex assignments are made easier when the instructor can show us using the projector	4.36 (.450)	4.26 (.516)	4.22 (.549)
Quizzes or tests through Blackboard give me faster feedback	4.40 (.420)	4.50 (.353)	4.06 (.658)
Overall, I am more satisfied with classroom configuration	3.85 (.809)	4.00 (.707)	3.79 (.854)
Overall, I am more satisfied with technology now available.	4.13 (.614)	4.19 (.571)	4.04 (.677)

Note. Room A *n*=69, Room B *n*=26, Room C *n*=72

Further, almost 64% of respondents in the Room A (vertical rows) group agreed or strongly agreed that they are satisfied with the configuration of their classroom while a little more than 74% of respondents in the Room C (vertical and slant) group agreed or strongly agreed that they are more satisfied with the configuration of their classroom, see Table 10. For the respondents in the Room B (horizontal rows) group, 73% agreed or strongly agreed that they are satisfied with the configuration of their classroom. In other words, more students are satisfied with the configuration of their classroom than are dissatisfied. However, those in Room C are the most satisfied. That room is arranged in with vertical rows down the middle and slant rows on each side of the room.

Table 10

Classroom Configuration Overall Satisfaction

Overall, I am more satisfied with classroom configuration	Room A (*n*=69)		Room B (*n*=26)		Room C (*n*=72)	
	Count	%	*Count*	%	*Count*	%
Strongly agree	21	30.4	8	30.8	12	16.7
Agree	23	33.3	11	42.3	41	56.9
Neither agree or disagree	19	27.5	6	23.1	13	18.1
Disagree	6	8.7	1	3.8	4	5.6
Strongly disagree	0	0.0	0	0.0	2	2.8

When asked to indicate their agreement with the statement, “Overall, I am more satisfied with technology now available in the classroom,” there was little statistically significant difference between students’ satisfaction with the technology available in all three rooms, see Table 9. The average score for question addressing overall satisfaction of technology available in the classroom Room A (vertical rows) mean 4.13 (*SD* = 0.614), Room B (horizontal rows) mean 4.19 (*SD*= 0.571) and Room C (vertical and slant rows) mean 4.04 (*SD*= 0.677). In other words, the difference between the mean score for students in Room B is statistically significantly different from the Likert score for students in Room A and Room C, even though each room contained desktop computers. Therefore, more students prefer to use desktop computers and are satisfied with the overall technology available in all three computer lab classrooms.

Observation findings help to further address the differences of overall satisfaction of technology and configuration of the computer lab classroom. Observational field notes included in the findings are described in the following section. For example, in Room A (vertical rows) during lecture days students overall are quiet, not looking at the instructor. Several students had headphones on or looking at cell phones, especially students in the back half of the room. Couple students have turned their chairs to look forward with feet propped up on another chair. Two students have personal laptops out looking at other websites. Every students has a computer in front of them working on other assignments or looking at other social media sites. Although during observation on application days, when the instructor demonstrated the skills, students in the front half of the room would ask questions while a couple students in the back half of the room asked each other. Students in the back asked more questions of each other instead of the instructor possibly do to the location of instructor computer (in the corner). Even though every student had to turn their head to look up at the projector screen and try to follow along with the instructor. Only a couple students would look up when the instructor encouraged students to watch while the application was demonstrated on the projected screen. Several students had personal laptops placed beside the desktop with the application instructions, using the laptop as a second monitor.

Similar observations were found in Room B (horizontal rows) and Room C (vertical and slated rows) during lecture days. Students would be quiet, on cell phones, especially in the back half of the room where the instructor could not see the student. A couple students in the back row took selfie pictures to post on social media. Students had personal laptops on the desk working on other assignments or looking at websites. One student was observed watching a television series with closed caption. In the three rooms, students in the front rows would answer questions and look up at the instructor. During application days, when the instructor demonstrated the assignment, students in Room B (horizontal rows) in the back half of the room had limited ability to see the projector. A couple students would assist each other in the back rows. Only a few students would ask for assist from the instructor. Similar observations were found in Room C (vertical rows) especially with students in the vertical rows, although students in the slanted rows appeared to look up more when the instructor mentioned the screen. As well as students in the slanted rows appeared to follow along with the instructor. In other words, the observation indicated that overall, students were satisfied with the technology available in the classroom, even though some students used laptops and were on their cell phones during lecture days. Yet, during the observation of students in each room configured differently indicated that students are unable to see the instructor or projector appeared disconnected from activities and peers. Although an exception in each room, students in the front rows or front half of the any room especially in Room C (slanted rows) can see the instructor and projector.

Additionally during the classroom observations, a frequency count of identified on-task and off-task behaviors were observed and recorded frequency of behaviors in each computer lab classrooms. On task behaviors recorded included listening/watching, raised hands, speaking peer to peer, responded to instructor, and hands-on activity. Off task behaviors recorded included passive, doing other work or being on cell phones, listening to others, disturbing others or playing in class. The frequency of *on-task* or *off-task* behaviors recorded during observations demonstrated that students in Room C (vertical and slanted rows) appeared to be more on task then students in Room A (vertical rows) and B (horizontal rows), see Table 11. Although, the overall percentage difference of students' on-task over off-task behavior in Room B (horizontal rows) was slightly less than Room A (vertical rows) in contrast to Room C higher frequency count of behaviors. In other words, students' on-task and off-task behavior reinforced that students want to see and have a voice.

Table 11
Observation of Behaviors in the Classroom

	Room A		Room B		Room C	
Frequency of Behavior	*f*	%	*f*	%	*f*	%
On Task N1	15	13.76	32	29.35	62	56.89
On Task N2	16	9.70	6	3.63	143	86.67
On Task N3	37	13.86	22	8.24	208	77.90
On Task N4	2	4.08	9	18.36	38	77.56
On Task N5	22	21.55	1	1.00	79	77.45
On Task Total/Average	92	12.59	70	12.11	530	75.30
Off Task F1	16	16.50	31	31.95	50	51.55
Off Task F2	206	46.92	31	7.06	202	46.02
Off Task F3	7	9.45	23	31.08	44	59.47
Off Task F4	3	8.33	4	11.12	29	80.55
Off Task F5	3	9.09	17	51.51	13	39.40
Off Task Total/Average	235	18.05	106	26.55	338	55.40

Note. N1=listening/watching, N2=raised hands, N3=speaking peer to peer, N4, responded to instructor, N5=hands-on activity, F1=passive, F2=doing other work (cell phones), F3=listening to others, F4=disturbing others, F5=playing

In addition, classroom observations support the findings that classroom configuration may affect students' on- and off-task behaviors. On-task student behaviors, including listening to or watching the instructor (56.89%), raising hands to ask or answer a question (86.67%), speaking with a peer (77.90%), responding to the instructor (77.56%), and participating in a hands-on activity (77.45%) occurred most often in Rooms C. However, off-task behaviors such as doing other work or being on cell phones were less frequent in Room B (7.06%) than these behaviors were in Room A (46.92%) and Room C (46.02%). Nevertheless, when tabulated, students in Room A (vertical rows) demonstrated fewer total off-task behaviors (18.05%) than students in Room B (26.55%) and Room C (55.40%). In other words, off-task behaviors are similar in each room although students in Room C (vertical and slanted rows) demonstrated more on-task behaviors than students in Room A (vertical rows) and B (horizontal rows).

During the classroom observation the research assistant counted frequency of interactions and behaviors while the researcher took observational field notes of the classroom environment, experiences and behaviors. Three themes emerged from the observation, students' inability to see the projector, distractions and ability to interaction in the classroom.

The first theme observed was students' inability to see the front of the room, projector screen or instructor without pushing chairs away from the table, turning heads or looking over or around a 24 inch computer screen. Students struggled to follow along as the instructor demonstrated the application assignment on the projector screen. The location of the screen displayed low to the floor in Room A and Room C. Also, the instructors stood in front of the projection screen in Room C due to the position of the instructor's desk. Therefore, students in the middle row of Room C could not see the projector screen. The effect of not seeing the demonstration of the application created confusion, students that had to turn their heads to see the screen were unable to follow along with the demonstration. For example, students who sat in the back row, unable to see what the instructor was doing appeared to give up on the assignment or struggled through the application without confidence. The ability to see not only the instructor, peers and the demonstration of the application contributes the feeling of being part of a community of learners.

Secondly, distractions in the room (i.e., cell phones or personal laptops) had students looking down, or at another computer screen. While the computer screen in front of the student is often considered a distraction, addition technology at the desk draws attention to the activity.

Students still used phones regardless of having access to the Internet on the desktop computer, especially in the back rows of the classroom. Although students responded in the survey with a strong preference to using a desktop, several students used personal laptops for various reasons. For example, two students were using their laptop to view, a second screen for the application assignment they were working on in class. Many students appeared to be working on, other homework, as evidenced by the application on the screen, word document or in another course on Blackboard. Students also watched movies including one student who had closed caption on during the lecture. Finally, many students were using another screen to post on, social media. For instance, several students in the back row used cell phones for social media or text.

The third finding draws on the interactions observed in the classrooms. Students in Room C (vertical and slanted rows) interacted more with the instructors than in Room A (vertical rows) and Room B (horizontal rows). Although in Room A the instructors would walk up and down the rows, students had to turn around to interact with the instructor or peers in another row. For example, students in Room C interacted with peers sitting next to them in the slanted rows while students in the vertical rows interacted occasionally with the person sitting next to them. The types of interactions in the computer lab classroom does not model a communicative or collaborative environment.

The observation data highlighted the challenges associated with getting students to interact with peers or the instructor, especially students in the back rows, regardless of the room. In addition, students' ability to see the projection screen indicated lack of motivation to interact in the classroom due to the placement of computers arranged in rows. If students could not follow along with the instructor during the demonstration or see the instructor, students appeared to disengage and be less motivated to interaction with peers. Yet, students in Room C demonstrated that students who could see the projector screen, especially in the slanted rows, interacted more with peers and instructor. For example, students in the slanted row had a better view of each other in the row and the projector screen. To further address interactions in the classroom, the following section measured students' perception of differences in interactions and engagement in different computer lab classrooms.

Differences in students' engagement and interactions

The second set of survey items asked students to reflect on their engagement in the classroom and interactions in the classroom. These items were compared across room, or based on the configuration of desks and computers in each classroom.

However, there was no statistically significant difference in engagement across the rooms. Since discussion is just one activity that could indicate engagement, this merely emphasizes that engagement is a broad concept that could include a variety of behaviors. In fact, students shared on the open response items that they defined engagement to include answering/asking questions, demonstration and completing assignments. For example, one student in Room A shared, "I consider being engaged in a computer lab classroom as having the teacher ask us questions and make us respond and also maybe having us work in groups will allow us to interact as a class." Another student shared, "I think being engaged would be to follow along with assignments and participate in discussion." Furthermore, one student shared, "paying attention to the projector screen is important. Using the screen share and being able to see the material without having to strain the eyes is important. Asking the professor for help and seeing step by step examples is beneficial." In other words, students in Room A (vertical rows) described engagement as following along, participating in discussion and working in groups.

While one student echoed a similar statement in Room B that “being engaged in a computer lab classroom could be defined as looking, engaging with professor when a lecture is being taught, not being tempted to do tedious things like checking emails, work for other classes even though you have option.” In contrast to the previous statement of a student in Room B (horizontal) described,

> “Being engaged in the computer lab is being able to pull up the power point the professor is on and click and follow the slides with him/her. If I have a question of a reference he/she makes I can google it faster than just sitting and waiting for him/her to explain it.”

Although another student in Room B shared, “I learn by example so definitely by doing examples and our teacher showing us how to do things with technology.” Therefore, several students in Room B (horizontal rows) supports the need for students to be able to see and be seen which reinforces demonstration.

Similarly, a student in Room C (vertical and slanted rows) described “being engaged in a computer lab classroom isn’t any different from any other classroom. We can still speak to the instructor and one another without any problem. Computers are the only beneficiary to the class.” Another student shared, “I am engaged by being able to see what needs to be done and following the instructions being projected at the front of the classroom.” While another commented, “being engaged is completing a task that has been assigned, if difficult following the instruction on the board at the front from the instructor.” Therefore, students in Room C (vertical and slanted rows) comments reflected their experience in the room. For instance being able to see and completing an assignment.

Statistically significant differences were found among classroom groups (i.e., Rooms A, B, and C) for three survey items measuring interactions among students or between students and the instructor. Respondents who were students in Room B (horizontal rows) were statistically significantly more likely to participate in class discussion than students in Rooms A (vertical rows) or C (vertical and slanted rows), see Table 12.

Table 12
Interaction Question Average Agreement

What classroom do you meet in?	Room A	Room B	Room C
(1=strongly disagree; 5=strongly agree)	*M* *(SD)*	*M* *(SD)*	*M* *(SD)*
I interact with the instructor in class.	3.68 (.932)	4.19 (.571)	3.62 (.972)
I am engaged in class.	3.97 (.727)	4.15 (.598)	3.66 (.942)
I participate in class discussion.	3.30 (1.19)	3.84 (.815)	3.27 (1.21)
I am involved in learning during class.	3.98 (.717)	4.23 (.543)	3.77 (.864)
I am attentive in class.	3.98 (.717)	4.23 (.543)	3.81 (.834)
I provide my opinion on questions from the instructor during the class.	3.44 (1.09)	3.61 (.979)	3.33 (1.17)
I receive feedback in class on my understanding of the course materials.	3.79 (.850)	4.07 (.652)	3.59 (.991)
I receive feedback from the instructor during the class.	3.78 (.860)	4.15 (.598)	3.69 (.923)

Note. Room A *n*=69, Room B *n*=26, Room C *n*=72

Although classroom observations found that students in all three rooms, Room A, B and C participated in classroom discussions if the instructor could see the student. For example, in Room A (vertical rows) the instructors could easily walk behind the students or between the rows and did during class. Only a select number of students in the front, about 8 to 10 students would discuss the application with the instructor. Similarly, in Room B (horizontal rows) the instructors could not easily assist students in the rows especially students at the farthest end of the row. Again, only students in the front two rows would participate in discussion with the instructor. In Room C (vertical and slanted rows) similar observations of behaviors in discussion occurred although students in the slanted rows participated more in the discussion with peers and instructors. In other words, 48.7% of students in room C reported that they agree or strongly agree that they participate in discussions while 43.5% of students in Room A reported the same, see Table 13). Accordingly, observation findings indicated that instructors in all sections offered a similar number of prompts to promote discussion. Further, instructors typically lectured, and then prompted students to answer questions and discuss the content, allowing for participation in classroom. Students had the opportunity to ask questions during the demonstration of the application assignments and discuss with their peers for assistance on assignments.

Table 13
Participate in Class Discussion Count and Percentage

I participate in class discussion.	Room A (*n*=69)		Room B (*n*=26)		Room C (*n*=72)	
	Count	%	*Count*	%	*Count*	%
Strongly agree	14	20.3	7	26.9	4	5.6
Agree	16	23.2	8	30.8	31	43.1
Neither agree or disagree	22	31.9	11	42.3	21	29.2
Disagree	11	15.9	0	0.0	13	18.1
Strongly disagree	6	8.7	0	0.0	3	4.2

Data collected through the online survey was analyzed to compare students' participation in classroom discussion across the three rooms. The results of Levene test (Appendices) revealed a statistically significant difference between students in Room A and Room C. Students in Room C (vertical and slanted rows) participated more often in discussion that students in Room A (horizontal rows). While students' self-reported response to participation in classroom discussion indicates a statistical significant, observational data indicated that only the students that could see the projector or instructor and could be seen easily by the instructor would actively participate in discussion. Therefore, the need to further seek understanding of differences in interactive behaviors compared to engagement in a computer lab classroom was defined by the students' in on open-ended question.

Accordingly, students in Room A agree or strongly agree (73.9%) that they are engaged in class, see Table 14. Likewise, students in Room C also reported that they agree or strongly agree (61.1%) that they are engaged in class. The observation of students in Room C indicated more engagement in class as measured through interactions with the instructor such as raising hands to ask and answer questions, as well as through interactions with peers seeking guidance on assignments. Students in Room C who sat in the slanted rows engaged more with peers than any of the students in Room A and B. For example, during classroom observations, students in Room C would assist or interact with other students in the row; not just the student sitting beside them on how to complete an assignment. While in Room A (vertical rows) and B (horizontal rows) students rarely spoke to the person sitting next to or asked for assistance. In other words, students that had the ability to see other students in the row. Students appeared to be more engaged and interactive with each other than students seated in rows where their only interaction could be with one or two people on either side of them.

Table 14
Engagement in Class Count and Percentage

I am engaged in class.	Room A (*n*=69)		Room B (*n*=26)		Room C (*n*=72)	
	Count	%	*Count*	%	*Count*	%
Strongly agree	20	29.0	9	34.6	8	11.1
Agree	31	44.9	12	46.2	36	50.0
Neither agree or disagree	14	20.3	5	19.2	25	34.7
Disagree	4	5.8	0	0.0	2	2.8
Strongly disagree	0	0.0	0	0.0	1	1.4

In short Room C, four rows were slanted on either side of the room for ease of movement within the rows and to improve the ability to see the projected screen. However, Room C also includes a middle row of computers, similar to Room A, where students must turn their heads or chairs to look at the projection screen. Room B was included in the table to demonstrate that students were off task more in a computer lab classroom arranged in traditional rows facing the front of the room.

In addition, the open response items on the survey asked students to define engagement in a computer lab classroom. Several ideas emerged from the 101 student responses. Sample comments from students provide additional insight into the students' perception of engagement in a computer lab classroom. These illustrate possible reasons for why there was a statistically significant difference between students' perceptions of their participation in class discussion and their engagement in class. The difference between participation and engagement applied to students' definition by each room. Overall, three main themes emerged as students defined engagement as answering and asking questions, instructor demonstrating the application skills, and completing in-class assignments. For example, one students said in Room A, "I consider being engaged in a computer lab classroom as having the teacher ask us questions and make us respond and also maybe having us work in groups will allow us to interact as a class." While another student in Room B described engagement as "being engaged in a computer lab classroom could be defined as looking and engaging with the professor when a lecture is being taught and not being tempted to do tedious things like checking emails and work for other classes even though you have the option." Yet another student in Room C shared, "being engaged in a computer lab classroom isn't any different from any other classroom. We can still speak to the instructor and one another without any problem. Computers are the only beneficiary to the class." In other words, students' definition of engagement is similar to traditional classroom engagement techniques. Although saying that students defined engagement in a way that shows the teacher is active and the students are passive. They described actions such as speaking to and looking at the instructor, asking questions of the instructor or answering questions posed by the instructor, and working in groups on tasks assigned by the instructor. All of these are teacher-centered behaviors rather than student-centered behaviors.

In addition to answering and asking questions, students described demonstrations done by the instructor as a method of engaging them in a computer lab classroom. For example, one student said in Room A (vertical rows), "In a computer lab classroom, engagement involves following along with the professor's slides on your own computer and asking for help with assignments when needed." Although another student shared in Room B, "It all depends on the student, I think the shared screens make it easier to be engaged, but once the students are on their own, it is almost impossible to gain attention with the internet in front of their face." The shared screen reference by the student is a software program that allows instructors to share their screen with students. Each instructor has access to the software program which during the observation this method of control was not used in the classrooms. A student in Room C shared, "I think being engaged in a classroom in a computer lab classroom is all based on following along and knowing what you're doing. Being engaged means knowing what to do during your assignments and being attentive." Although another student in Room C commented, "when instructor ask different students to read a slide from the PowerPoint, and that gets the class involved but not too involved." Overall, students' perception of engagement as described indicates that having an opportunity to follow along with the instructor, yet one student described engagement as involvement in class by reading PowerPoint slides.

In addition, students included completing assignments as something that demonstrated that they are engaged in the class. One student shared in Room A that “attentive to what the instructor is doing/teaching. Completing assignments on time as they come due to the benefit of doing them on the computer. While a student in Room B shared “I think being engaged in a classroom in a computer lab classroom is all based on following along and knowing what you’re doing. Being engaged means knowing what to do during your assignments and being attentive.” Another student in Room C commented, “I would say some pay attention, especially when we are doing an assignment together. However, when it is just lecturing little pay attention due to either the possible distractions a computer creates or the fact that in some positions it is hard to see the instructor.” Another student in Room C echoed a similar comment, “Teacher interacting with students is necessary, easy to get off track.”

In summary, the students’ definition of engagement not only included answering and asking questions, the standard definition but also that demonstration and assignments described engagement in a computer lab classroom. Although students’ definitions of engagement provided insight into strategies that encourage engagement, students also reflected on what helped or hindered their ability to interact in the computer lab classroom.

In addition, open-response items on the survey asked students to describe a classroom setting that either facilitated or hindered students’ ability to interact with the class. Students seemed to define “classroom setting” more broadly than just the physical space of the classroom. For example, student not only shared thoughts about their instructors’ teaching but how PowerPoints helped or hindered their learning. For example according to one student in Room C, the arrangement of the classroom “helped me follow the Power Point while the teacher was going through it.” Another student shared “The open layout allows for the Professor to roam freely, answer any questions other students or myself might have." While students identified their instructor as important to their learning, the focus of the research was not on instructors. Nevertheless, this indicates that students may attribute their attention in class more to the instructor's teaching style than to the arrangement of the classroom. A couple example statements from students' referenced instructors help were not based on pedagogy, a method of instruction but mentioned the teacher or professor was helpful in other ways, supportive and encouraging to the students.

Students also talked about specific class features that they believe influence their interaction with the instructor and/or other students in the classroom. Some of these features facilitated interactions, see Table 15. They had to do with the physical classroom space while others were about how the instructor teaches the class or who the other students in the class are. Five features emerged as the most commonly named features that students believe influence classroom interactions. Student responses indicated that the arrangement of Room A facilitated student interaction, although Room A is arranged by vertical rows of computers. Students in this room on the outside rows face a wall while the middle row students face each other hidden by the computer screens. Interaction in this room requires students to turn away from the computer.

Table 15
Frequency of Features that Facilitated Classroom Interactions

	Room A		Room B		Room C		Total
Helped	*f*	%	*f*	%	*f*	%	%
Instructor	5	6.8	3	16.7	14	20.3	43.8
Arrangement	9	12.2	1	5.6	5	7.2	25.0
Projector	6	8.1	2	11.1	2	2.9	22.1
Computers	5	6.8			7	10.1	16.9
Small Class	3	4.1	1	5.6	5	7.2	16.9
Peers	4	5.4			7	10.1	15.5
Demonstration	5	6.8			5	7.2	14.0
Independent			2	11.1			11.1

For example, a student in Room A described an arrangement that helped as "A classroom with the chairs and desks surrounding the professor made it easy to focus because he/she was in the center of the room as opposed to one corner or on one wall." Another student in Room B shared, "I feel like when we all are in rows and columns facing the teacher in a classroom allows me to better communicate with the teachers and my fellow classmates." On the other hand, students in Room C comments about room arrangement focused more on open concept or having the ability to move around in the class. For example, "one student shared two large tables and the students sit around it not separated from one another." Or as another student commented, "the open layout allows for the professor to roam freely and answer any questions other students or myself might have." A similar statement from a student mentioned openness, "the classroom is open and can interact with instructor and classmate." In particular one student described a classroom that helped one time with class discussion "when we formed all the desks into a circle." Together with this information from students' the theme of arrangements that helped students' learn emerged from the findings.

Overall, students described the projector as helping interaction with the instructor while the instructor demonstrates and assists students. One student described what helps is "A teacher that uses the projector but also writes on the board for clarification helps me interact with the professor and other students." Another student shared "I like how my instructor is able to project his screen and walk us step-by-step on how to do new activities in class. In addition, students perceived sitting in front of the screen as independent work as one student responded,
"In the settings behind the computer, we can make each work independently after the professor explains the assignment. Then if we have any questions he works his way around to you or if most of the class has the same question he will put it up on the projector." While students

indicated the projector helped one student addressed classroom computers, “I like that we all have computers to sit instead of carrying mine with me to class. We all work together but on separate screens.” Although as one student shared, “Sitting next to someone in a computer lab class can be beneficial. In this class when you are working on a Microsoft Office assignment, you can ask your partner for assistance if the professor is busy helping someone else. It helps to keep the class flowing throughout the 50 minutes.”

Students also named several features that hinder interaction among students and between students and the instructor in a computer lab classroom, see Table 16. The frequencies and comments from students align with the classroom observational field notes regarding the configuration of Room A that vertical rows limit a student’s ability to see and interact in the classroom. For example, in Room A (vertical rows) the students in the outer rows face walls while the middle vertical rows face another row with computers screens between students. Students would turn their heads to see the projector or instructor. Likewise, students in Room B (horizontal rows) would look around the computer screen to see the projector or look over the screen to see the instructor. Students in the back three rows could easily hide behind the screen from the instructor. Table 16 shown below indicates the frequency of codes by room. Notably, students indicated that rows are a hindrance, as well as movement to see the screen, large classes and lectures.

Table 16
Frequency of Hindrances

	Room A		Room B		Room C		Total
Hindrances to Interaction	*f*	%	*f*	%	*f*	%	%
Rows	10	13.50	3	16.7	3	4.3	34.50
Move	8	10.80	2	11.1	1	1	22.90
Large Class	5	6.80	1	5.6	3	4.3	16.70
Lecture	4	5.40			2	2.9	8.30

Sample comments address the arrangement of tables/desks in vertical or horizontal rows with students not facing the front of the room or the projector screen. One student said that although they “think the use of technology is very beneficial,” that “the use of rows in the classroom makes seeing the projector difficult at times and causes disconnect between students and professors.” Another student explained, “I don’t like the classroom configuration that is different from the traditional rows with the teacher at the front/lecture hall style class. It is hard for me to stay focused and know where to direct my attention. A third student noted that “Rows all facing the same direction somewhat hinder my ability to interact with the class because you can only really talk to the people sitting beside you.” Some notable examples of additional hindrances commented by students’ included the following statements: “It hinders me to be facing sideways and trying to see the screen from the back. I would like to be facing the teacher and have more interaction.” Another example, “I have to move myself a little to face the instructor directly. The computers do not distract me; my own thoughts are distraction enough.” And “I hate having the computer screen between the instructor and me. It is more distracting.” Overall, students’ comments suggested rows hindered the ability to interact, specifically in Room A, where the rows align vertically with the room dimensions allowing students to see each other in the middle row but not the outside rows. Rows, where students had to turn their head especially, was considered a hindrance.

The qualitative data of what facilitated and hindered interactions based on students’ perception contributed to understandings of the importance of computer classroom configuration. Moreover, that interaction in the computer lab indicated that students preferred arrangements where the projectors or instructors can be seen in the front of the room. In other words, one comment from a student indicated “When the desks are facing the professor, and he/she is able to interact with us still such as a circle is helpful." Therefore, the design of Room C, slanted rows allowed students to see the projector, yet the middle rows had to turn heads to look at the projector or instructor. At the same time, the number of desktop computers are placed within the dimension of the rooms to accommodate course enrollments.

Self-efficacy in the computer lab

In addition, the third question set addressed self-efficacy questions about the course. To give an illustration, the following Table 17 shows the count for students' responses including "strongly agree" and "agree" that 63 students who meet in Room A think they will do well in this class while fewer students, 61 who meet in Room C for this class think they will do well.

Table 17
Self-Efficacy in Class Count and Percentage

Considering the difficulty of this course, the teacher, and my skills, I think I will do well in this class.	Room A (*n*=69)		Room B (*n*=26)		Room C (*n*=72)	
	Count	%	*Count*	%	*Count*	%
Strongly agree	33	47.8	11	42.3	17	23.6
Somewhat Agree	30	43.5	12	46.2	44	46.2
Neither agree or disagree	6	8.7	3	11.5	10	13.9
Somewhat disagree	0	0.0	0	0.0	1	1.4
Strongly disagree	0	0.0	0	0.0	0	0.0

An independent samples *t*-test on each question within the question set indicated one question, "Considering the difficulty, I think I will do well in this class" indicated significance since p <.005 (p =.026). For this item, the difference between the mean score 1.93 for students in Room C is statistically significant from the mean score 1.61 of students in Room A as shown in Table 18.

Table 18

Self-Efficacy Question Set Average Agreement

What classroom do you meet in? (1=strongly disagree; 5=strongly agree)	Room A *M* *(SD)*	Room B *M* *(SD)*	Room C *M* *(SD)*
I can gauge whether I am following the course materials during the class.	3.98 (.717)	4.30 (.489)	3.88 (.785)
I can assess my understanding of the course materials with respect to other students during the class.	3.97 (.727)	4.26 (.516)	3.84 (.815)
I believe I will receive an excellent grade in this class.	4.18 (.573)	4.11 (.625)	3.97 (.726)
I'm certain I can understand the most difficult material presented in the readings in this course.	3.89 (.778)	4.11 (.625)	3.83 (.824)
I'm confident I can understand the basic concepts taught in this course.	4.39 (.430)	4.46 (.380)	4.30 (.491)
I'm confident I can do an excellent job on the assignments and tests in this course.	4.07 (.655)	4.07 (.652)	3.95 (.736)
I expect do well in this class.	4.31 (.481)	4.34 (.462)	4.27 (.510)
I'm certain I can master the skills being taught in this class.	4.20 (.563)	4.00 (.707)	4.00 (.707)
Considering the difficulty of this course, the teacher, and my skills, I think I will do well in this class.	4.39 (.430)	4.30 (.489)	4.06 (.658)

Note. Room A *n*=69, Room B *n*=26, Room C *n*=72

Although the course content delivered in each section was the same, additional variables such as instructional strategies could contribute to the self-belief of doing well in the class. The additional variables could contribute to the overall, non-significant findings regarding self-efficacy that based on instructors, students had more confidence. Therefore, based on the quantitative analysis of the survey measuring students' perceptions of self-efficacy, students' belief that doing well in the class. The findings supported the need to explore differences in students' level of confidence or belief that they are capable of learning the content when computer lab configuration is taken into consideration. In the following section, qualitative findings from classroom observations provide possible explanations for these quantitative findings. In short, students' perception of computer lab classrooms affects engagement and interaction based on the design of the room. The following section summarizes the quantitative and qualitative findings of the research.

Conclusions

The present study has shown that room configuration affects interactions, although insignificant findings resulted from quantitative questions to address classroom configuration and self-efficacy. The findings from the research are noteworthy due to mixing the data with qualitative data to identify what helps or hinders interactions when students sit behind a computer screen. Equally important, students' perception of engagement in a computer lab classroom indicated that not only answering and asking questions but that demonstrations to complete assignments described engagement in a computer lab. In conclusion, the qualitative data supports the quantitative findings in that Room C classroom configuration contributes to interactions and engagement student preference in regards to the design of the computer lab classroom. Chapter Five, a summary of the study and findings, includes overall discussions with conclusions related to the literature review. In addition, recommendation for future studies contributes to the final conclusion of the research.

Chapter Five: Discussions and Conclusions

This chapter presents a summary of the study and important conclusions drawn from the data presented in Chapter 4. It provides a discussion of the implications for action and recommendations for further research. The purpose of this convergent mixed methods study was to understand students' perception of engagement, interactions and self-efficacy in a computer lab classrooms configured differently by rows. The study was an attempt to identify if different room arrangements contributed to engagement, interactions, and students' self-efficacy. This chapter will provide a summary of the study and findings, discussions about the research and discussions related to the current literature. Finally, recommendations for future research are presented to narrow the gap of research on students' perception of design or redesigning computer lab classrooms. In conclusion, this study contributed to the limited research that explored students' perception sitting behind a computer screen in computer lab classrooms for future interactive, engaging classroom designs.

Summary of Study

The topic of students' perceptions of engagement and interactions based on room configuration, warrants research attention that allows students to develop certain 21st-century skills in various learning environments. While classroom computers provide unlimited access to information and an opportunity to communicate and interact with the teacher, the computer screen could encourage or discourage social interactions that contribute to the development of intellectual self-efficacy (Solhaug, 2009). Even though the use of technology in the classroom engages students in active learning or meaningful experiences, opportunities to critically think about the process or purpose of the use of technology in the classroom create a challenge to learn relevant knowledge. As educational institutions face financial constraints building new schools or renovating current structures, little research explored how the computer lab classroom in regards to students' self-efficacy. By exploring the impact of engagment and interactions in computer lab settings and what outcomes affect a learners' intellectual self-efficacy, this study contributed to the limited research. Moreover, this study sought to understand how and why computer lab classrooms configured differently by rows affect students' intellectual self-efficacy. Three research questions guided the study:

1.) What are students' perception of the configuration of computers in the classroom?

2.) What are the differences in students' engagement and interactions based on the configuration of computers in the classroom?

3.) What are students' perceptions of engagement and self-efficacy based on the configuration of computers in the classroom?

To seek understanding of engagement and interactions in computer classroom configuration, a convergent mixed method (Creswell and Plano Clark) was utilized and framed through a social cognitive theory (Bandura, 1989) and analyzed and interpreted by mixing of the quantitative and qualitative data. The merge of data from the quantitative and qualitative data compared the findings to confirm or deny students' perception of interaction in a computer lab classroom. In addition, differences within one set of results based on interactions were examined and organized to conduct further analysis of the data. Creswell and Plano Clark (2011) confirm that a mixed methods study provides valuable insight into the identification of key variables based on the configuration of computer classrooms. Furthermore, a convergent parallel mixed-methods design provided a theoretical lens that strengthened the validity and reliability of the research (J. W. Creswell & Plano Clark, 2011). Therefore, this study provided findings based on students' perception of the three computer lab classrooms.

A purposeful selection of 440 undergraduate students enrolled in an Introductory Business Computer Applications course (IBCA) at a Midwestern College of Business. The participants of the study were at least 18 years of age and enrolled in the IBCA course. Through the use of online survey instrument, Qualtrics, students agreed to participate in the study voluntarily. In addition, observations of interactions and behaviors in the three different computer lab classrooms. The data collected provided additional findings to gain a complete picture to understand the quantitative data results further. Open-ended response questions sought to understand from a students' perception of the definition of engagement and interaction in a computer lab classroom. During the deployment of the survey, the researcher gathered thick descriptions of interactions during classroom observation of the three computer lab classrooms. Therefore, a purposeful sampling of one course within the Midwestern College of Business provided insights for other departments that utilize computer lab classrooms, which inspired this research.

Since theory explains a particular phenomenon, this research was grounded in Albert Bandura's (1989) social cognitive theory. Self-efficacy as a concept relates to an individual's self-esteem. The learner builds self-esteem by learning and mastering challenging skills in life. Self-belief in success against all the odds requires a person to have strong faith in their ability to learn new things, which tends to develop a feeling of self-efficacy. Self-efficacy beliefs are developed from four sources: observation; performance; emotions; and persuasions. The most powerful of these, Bandura (1977, 1989) hypothesized, included persuasion related to knowledge. Therefore, the next section describes the findings associated with Bandura's (1989, 1977) social cognitive theory.

Summary of Findings

Situated within the framework of Bandura's (1989, 1977) social cognitive theory, this study attempted to gain an in-depth understanding of students' perception of engagement and interactions in computer lab classrooms that affect self-efficacy. In addition, the qualitative response from students to define engagement in a computer lab and what type of room configurations help or hinder students' interaction in the classroom contributed to the quantitative findings. The overall research findings indicated significance in one set of questions related to interactions, especially students' participation in two rooms configured differently by rows.

Students' responses indicated no statistical significance for overall satisfaction with classroom configuration. Although based on a percentage of strongly agree and agree, students indicated Room B (horizontal rows) computer lab classroom was satisfactory despite being set up in the traditional rows with the instructor at the front of the room. However, students shared that the rows hindered their ability to interact with peers and the instructions. In addition, due to the layout of the rows and based on the dimension of the rooms, long rows limited the view of students to see the projector or instructor. While students in Room A (vertical rows) shared the rows not facing the projector or instructor hindered their ability to see the screen without turning their heads. Similarly, students in Room C (vertical and slanted rows) shared the inability to see in the vertical rows positioned in front of the instructor desk. Moreover, students described engagement in the computer lab required answering and asking questions plus demonstration to complete the assignments. Yet, classroom observations of engagement found students disengaged in part due to an inability to see the projector, front of room or instructor. In addition, students showed disengagement with heads down, distracted by personal cell phones and personal laptops, specifically in the back rows of the three classrooms during lectures. Whereas during the observation students that could see the projector, specifically in Room C (vertical and slanted rows), students could follow along with the instructor during demonstration of applications. Overall, observations in Room A (vertical rows) and Room B (horizontal rows) indicated students' inability to see and follow along with demonstrations increased students' distraction or lack of interest to interact with the instructor and peers. Therefore, even though similar behaviors were identified in Room C, students that were able to see the projector, instructor and follow along on applications engaged more with peers and the instructor.

For further clarification of engagement in a computer lab classroom, students' definition of engagement included themed patterns of behaviors, answering and asking questions, which is similar to traditional classroom engagement. Although, as participation had been defined as ranges of response to peer to peer or to a teacher's directions to activities (Fredricks, Blumenfeld and Paris ,2004 as cited in Finn, 1989) students could have a different perception of participation. Whereas engagement has been defined as a passive interaction that only the instructor can arouse by questioning the learner (Lawson and Lawson, 2013), this research gathered students' definition of the engagement in a computer lab classroom. As a result, students' definition of engagement included the ability to see the instructor demonstrate the application assignments. While all of these behaviors related to engagement have been identified students' participation in the classroom indicated significant findings based on room configurations. Although students in Room A (vertical rows), strongly agree and agree average response 63.50%, and students in Room B average response 57.70% indicated students in the vertical rows participation in discussion, yet classroom observations of behaviors in Room A described a different story. In contrast, students in Room C self-reported in the survey they strongly agree or agree in participation of discussions averaged 48.70%, yet classroom observations of behaviors found students more engaged with peers, instructor and on task. Even though students in Room B (horizontal rows) strongly agree and agree their engagement in class was 80.80%, higher than in Room A (vertical rows) 73.90% and Room C (vertical and slanted rows) 61.10% . While the environments and activities conducted with the students consisted of the same type of lecture and same application assignment, students observed behavior in each room differed than students' self-reported responses. Accordingly, discussion prompts by instructors in all sections observed presented adequate and appropriate opportunities for students to participate in class discussions. Instructors in all three rooms would ask students to respond, or ask students for questions about content or application assignment. Therefore, in terms of the definition of participation in discussion could have different meaning than being engaged in class based on students self-reflection. Furthermore, the need to ask students to define engagement in a computer lab classroom. Therefore, the definition of participation and interactions in computer lab classrooms, with observational frequency of on task and off task engagement and interactions indicated students stayed on task in Room C, even though all three rooms observed almost the same frequency of off-task interactions.

Finally, students described what helped or hindered their ability to participate or interact in the computer labs. Students' coded responses developed into five main themes regarding classroom configuration that helped them interact in the classroom. The room arrangement comments showed responses from two of the three classrooms supported quantitative findings of preference in room configuration similar to Room C. Overall; students described the projector as helping interaction with the instructor while the instructor demonstrates and assist students. In addition, students perceived sitting in front of the screen as independent work but could work with peers. In alignment with students' perception of preferred technology to use in a classroom, students appreciate the desktop computers instead of bringing a laptop. Although according to Kay and Lauricella (as cited in Dahlstrom, Walker, & Morgan, 2013) research states that 90% of students in universities and colleges own a laptop computer. In addition, one student shared what they felt could help facilitate interactions in the classroom would be a classroom with the chairs and desks surrounding the professor made it easy to focus because he/she was in the center of the room as opposed to one corner or on one wall.

However, students also reported that the configuration of rows, specifically in Room A and Room B as a hindrance to their ability to see, and be seen by the instructor plus interact with peers and the instructor in the three classroom. Moreover, if the students are seated in rows without a clear view of the projector or front of the room, students disengaged. Overall, the findings from this study indicated that students' perceptions of the utility of the space should be considered when designing or redesigning traditional classroom spaces. Students' perception should be considered that enables students to become part of a learning community. A learning community where students can communicate, collaborate and develop creative, critical thinking skills required for the 21st century. In the next section, discussion and implications for future actions and conclusions as a final point.

Discussion

This section focuses on limitations of the findings and conclusions. As is right with any type of inquiry, especially those involving the interpretation of others' stories, researcher bias becomes a potential limitation. Throughout this study, my experiences, assumptions, and preconceptions about computer lab classrooms have influenced the way the phenomenon of this inquiry was designed, conducted and analyzed. However, the inclusion of my perspectives toward this inquiry allows the reader to see how my thoughts converged with those of the observations and contributed to the analysis of the findings.

Conclusions from the findings. Several conclusions can be drawn from the mixed methods data analysis of this study. The first conclusion tested Bandura's (1989) social cognitive theory and Bandura's (1977) self-efficacy theory in that self-efficacy is a feeling that can be influenced by environment, behaviors and personal beliefs. Questions in the survey assessed to what extent students' perceive interactions and engagement in computer lab classroom based on the different configuration of the rooms affects a students' self-efficacy. In the following diagram (Figure 4), an illustration of the correlation of social cognitive theory depicts the relationship to the data collected in this study. The gray boxes in the diagram describe the three areas related to social cognitive theory and the types of interactions within each domain. The inner boxes illustrate the findings relevant to Bandura's (1989) social cognitive theory. In addition, the diagram provides a visual representation of how the triangulation of the data contributes to the research on students' perception of computer lab classrooms.

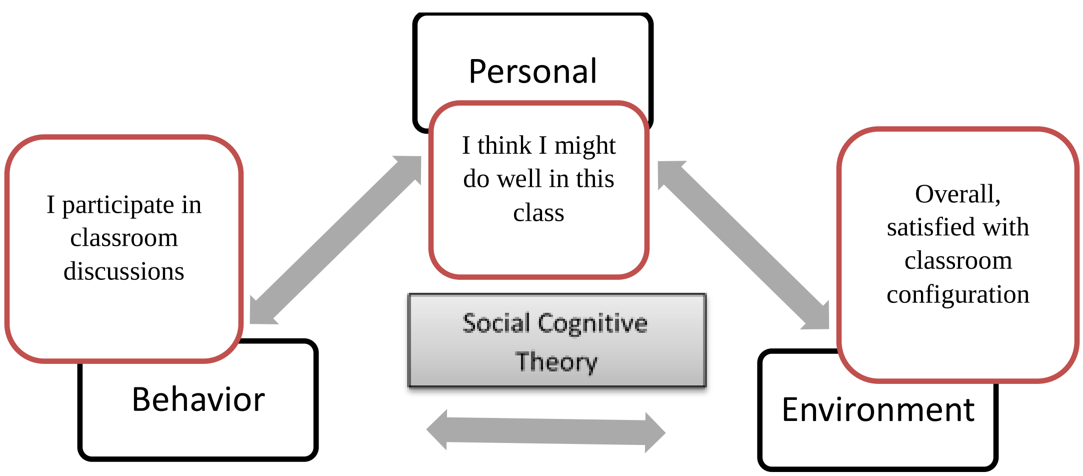


Figure 4 Illustration of Findings Related to Social Cognitive Theory

Even though students' perception of overall, classroom configuration indicated a small statistical significance in the findings by rooms, the qualitative data indicated the configuration of Room C (vertical and slanted rows) contributed to engagement and participation in classroom discussions. Therefore, in my opinion, computer labs configured in traditional classroom rows, horizontal rows of desks or tables limits students ability to interact and participate during standard lecture-style instruction. While more and more students sit behind a computer screen in rows, the row becomes a hindrance to interact or participate with peers and the instructor. Although the size of the computer screen measured the same in each room, 24 inches, the arrangement that best suited the view of the projector or instructor had rows slanted and staggered for students to see around the screen. As one student shared what helped being engaged and being part of the learning was described as a circle formation. In addition, the definition of engagement not only required answering and asking questions of the instructor but that the ability to see the demonstration was mentioned that helped students complete assignments. I hold the opinion that students see rows of desktop computers as a traditional classroom which mirrors the traditional lecture style instruction. Yet, with computers on tables in rows confined to electrical outlets and network connectivity creates an environment oto work independently on assignments. Although to prepare students for necessary 21st-century skills – communication, collaboration, and creative thinking – the design or redesign of a traditional classroom needs to take on a different shape within the room. As instructors help to inform the minds of students, the shape or arrangement of computers can create an environment where students participate and engage in an inclusive, active learning environment. The following section discusses the conclusions related to gaps in the literature.

Discussion of the Conclusions Related to Literature

Decades of research have publicized the multiple benefits of active learning environments to engage students in traditional classrooms. The review of the literature identified a gap in the research associated with engagement and interactions in a computer lab classroom related to intellectual self-efficacy. This research provided data that explored how students perceive traditional classrooms converted to computer lab classrooms contributed to the phenomena of students sitting behind a computer screen become confident and knowledgeable. Researchers van Dinther, Dochy & Segers (2011) stated that knowing factors that affect the development of self-efficacy in higher education related to students' goals can help institutions develop and plan educational programs or spaces for learning. As suggested by Karich, Burns, and Maki (2014), additional studies need to identify behavioral variables other than measurement of academic achievement, which indicate that the learner has control utilizing technology that may enhance engagement or participation but may not increase learner self-efficacy. They noted that future research needs to explore other underlying mechanisms related to the effectiveness of educational technology beyond learner control that more directly relate to positive learner self-efficacy regarding the knowledge of content.

Researchers Bradley and Lomicka (2000) shared in a need to understand the problem perception of students indicates that the lab offers a more relaxed environment that students do not take as seriously as that of their regular classroom. Question the purpose of coming to the lab as a class, since it is not apparent why the completion of these activities should require their presence within the four walls of the computer-enhanced classroom. To understand the perception of students, students defined engagement in a computer lab classroom to include not only answering and asking questions but a demonstration to complete the assignments. In my opinion, alignment of the objectives to the activities recreates relevance for the students to stay on task. The classroom observational data of Room C indicated that students seated in the slanted rows stayed on task more than students in Room A and Room B.

Researchers Nordquist and Laing (2014) discovered physical learning spaces must be reimaged for new modes of social and interactive learning that will blend and optimize physical settings and technologically enabled experiences. New learning experiences need to be created at every scale of the learning institution – the classroom, the building, and the campus. Students' response to qualitative findings indicated what helped students to interact in the computer lab required a room arrangement that allowed students to see the projector and the instructor such as Room C, slanted rows. In addition, students described the projector as helping to interact with the instructor while the instructor demonstrates and assist students. Students also perceived sitting in front of the screen as independent work but could work with peers. In alignment with students' perception of preferred technology to use in a classroom, students appreciate the desktop computers instead of bringing a laptop, although observational field notes described students used laptop computers in the classroom with desktop computers as a second screen for social media (Facebook) or to watch movies during class.

Conclusions

During the past two decades, education has increasingly seen an emphasis on student engagement, motivation and interaction in traditional classrooms (Bartimote-Aufflick, Bridgeman, Walker, Sharma, & Smith, 2016).While classroom computers provide unlimited access to information and an opportunity to communicate and interact with the teacher, the computer screen could encourage or discourage social interactions that contribute to the development of intellectual self-efficacy (Solhaug, 2009). Even though the use of technology in the classroom engages students in active learning or meaningful experiences, opportunities to critically think about the process or purpose of the use of technology in the classroom create a challenge to learn relevant knowledge. Researchers Bradley & Lomicka (2000) found that a student's perception of the computer lab classroom environment is "like going on vacation" from a traditional classroom. In addition, students' perception of the individual workstations indicates that students work alone on assignments, which contradicts the idea of social interaction that further develops a sense of belonging, confidence, and empowerment of self-knowledge (Bradley & Lomicka, 2000). However, limited research focused on the practice of student's perception regarding interaction and engagement in a computer lab classroom. Therefore, the need for a mixed method study to explore student's perception of interaction and engagement in three computer lab classrooms arranged differently within traditional classrooms.

I have chosen to study the interactions of students in a computer lab while observing students' sitting behind the computer screen. My experience as a graduate student, instructor and director of technology in k-12 schools provided a different perspective about classroom environments, their purpose in alignment with the objectives of the course. Therefore, an example of the various behaviors or interactions such as: making no eye contact with the instructor; slouching, or looking only at the computer screen when asked to respond to a question has a self-efficacy effect on students' future work ready skills.

Implications for Action

This study included quantitative and qualitative data from a students' perspective. I would recommend piloting the following in future design of computer lab classrooms. Based on the observations and comments, a circular or semi-circular design of the room, similar to a band room would provide students the ability to see the projector and instructor.A tiered platform of semi-circular design allows students to see over the screens. Limitations to a curvature design would include electricity, network cables plus limited seating, students' ability to see the projector, instructor, and demonstration of assignments. The instructor station would be stationed in the middle of the room or a mobile platform. Another suggestion includes dual screens that allow students to view the projected demonstration with students working on the second screen. The qualitative observations and responses indicated that students in the slanted rows of Room C could see the projector, demonstration, and instructor. The following illustration (See Figure 5) compares suggested room design to a traditional computer lab design that allows all students to see over and around the computer screens.

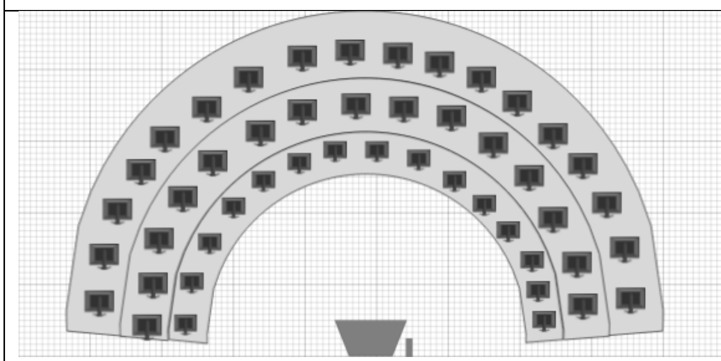
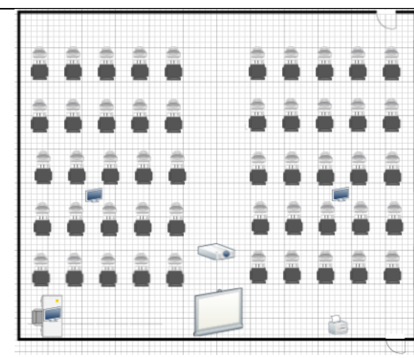
Suggested Room Design	Room B Instructor's computer station in the corner
	

Figure 5 Room Design Comparison

Recommendations for Further Study

This study included quantitative and qualitative data from a students' perspective. I suggest the following recommendations for further study. Further research is still needed in order to inform future architects on classroom design. Given that availability of technology in the classroom needs to focus on personalized learning that enhances a career choice. As discussed in the literature review, the majority of the research focused on engagement with a lack of understanding the complex phenomenon especially from a students' perspective; therefore, future research needs to consider evaluating a comparison of computer lab classrooms interactions to an interactive learning space that allows students to move the tables and chairs to form groups or pods of learning communities.

The present study contributes to the literature as it relates classroom designed for engagement and interaction that enhances a students' self-efficacy. This research highlights the role of technology-enriched classrooms, teachers' struggle implementing the best pedagogical strategies to engage and interact with students, as the computer screen might be viewed as a potential hindrance to or distraction in preparing young people to appreciate life skills taught in school. Schools provide a solid base of knowledge, character building and the skills required to be contributing citizens to society in the future (Solhaug, 2009). Workplaces in the future expect students to be model workers with character, knowledge and the skills to be mobile, collaborative, communicative and connected to an international digital world. As schools and universities continue to design or redesign technology-enhanced classrooms with computers, perhaps exploring students' perception of interaction and engagement will provide insights for future classroom designs and pedagogy that stimulates a collaborative, communicative learning environment. This research explored how computer lab classrooms configuration interactivity effects student's belief in knowing the content. In the next section, the research is presented with a final conclusion.

Concluding Remarks

This research explored how computer lab classrooms configuration interactivity effects student's belief in knowing the content. The findings support a need for a change in classroom designs, especially in computer lab classrooms. Traditional rows in the classroom hinder students' ability to interact with peers and instructors, especially if the outcome of the course is to develop collaborative, communicative and creative-thinking skills for future careers. Classroom designs need to consider the purpose for classroom and how the space impacts the learning process for students. For example, the course outcome for the Introduction to Business and Computer Application includes discussion of areas in business, apply technology to, design, create and produce deliverables for problem-solving business situations, yet rows are not conducive to enhance the learning experience. In addition, technology in the classroom, desktop, laptops or cell phones will not be going away, plus undergraduates have no concept of a world without access to information and technology. Therefore, classroom design needs to focus on the purpose of the room using computers as an extension of the learning experience, not just as a piece of equipment to be part of a traditional classroom. Classroom design is a missing piece of the puzzle in understanding why students are disengaged sitting behind a computer screen. As Bandura and Wood (1989) defined social cognitive theory to include personal, behavior and environment affect the educational learning experience, my research has demonstrated that a more in-depth analysis of environment needs to become an essential part of space design for future classrooms.

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APPENDICES

Appendix A: Online Survey Questions to Address Research Questions

Demographics					
Current Year in College:	Freshmen	Sophomore	Junior	Senior	Graduate
With which gender do you identify?	Male	Female	Prefer not to disclose		
When using technology devices in the classroom, which device do you prefer to use to complete assignments?	Desktop computer	Laptop computer	Cell phone	Tablet (iPad)	Other______
When in high school, our classrooms had access to which of the following technology?	Computer labs	Mobile laptop carts	1:1 laptops or iPads	Personal laptops	Technology was not available in the classrooms
For the class you are currently taking with this instructor, what is the classroom number?	211	212	214	Not in this building	
	Strongly Agree =5	**Agree =4**	**Neither Agree or Disagree=3**	**Disagree=2**	**Strongly Disagree=1**
1. The classroom configuration makes it easier to work in teams					
2. The technology in the classroom enables me to do web research and assignments					
3. The classroom configuration accommodates all my instructors' teaching styles					
4. The classroom technology allows instructors to explain problems/assignments more easily by showing us					
5. The classroom configuration allows us to critique problems and provides solutions that students put on the whiteboards (modified to shared on the screen)					
6. The classroom configuration allows us to review the work of other teams more easily					
7. Learning is easier when instructors use multiple technologies simultaneously (SmartBoard, whiteboard, overhead) modified to projector					
8. Detailed or complex assignments are made easier when the instructor can show us using the Smartboard (projector) or shared screen					
9. Quizzes or tests through Blackboard give me faster feedback					
10. Overall, I am satisfied with the classroom configuration					
11. Overall, I am satisfied with technology now available in the classroom 12. Overall, I am satisfied how often peers engage in this class.					
13. I interact with the instructor in class.					
14. I am involved in learning during class.					
15. I am engaged in class.					
16. I am attentive in class.					
17. I participate in class discussion.					
18. I provide my opinion on questions from the instructor during the class.					
19. I receive feedback in class on my understanding of the course materials.					
20. I receive feedback from the instructor during the class.					
21. I can gauge whether I am following the course materials during the class.					
22. I can assess my understanding of the course materials with respect to other students during the class.					
23. I believe I will receive an excellent grade in this class.					
24. I'm certain I can understand the most difficult material presented in the readings in this course.					
24. I'm confident I can understand the basic concepts taught in this course.					

25. I’m confident I can do an excellent job on the assignments and tests in this course.
26. I expect do well in this class.
27. I’m certain I can master the skills being taught in this class.
28. Considering the difficulty of this course, the teacher, and my skills, I think I will do well in this class.

Qualitative data collection: Posttest Open-Ended Questions

- Classroom engagement is an active state of responding to a class by degrees of attention, curiosity, interest, positivity, and passion for the content. (Hidden Curriculum, 2014). How would you define **being engaged** in a computer lab classroom? Please be specific.
- Please describe a classroom setting that either helped or hindered your ability to interact with the class?

Appendix B: Student Engagement Class Observation Checklist

Observer____________________________________
Teacher Observed____
Date ______________________________________ Time of Observation ____:____ to ____:____

Time																											Notes
:																											

<u>On Task:</u>
N1 - on task: listening/watching
N2 - on task: raised hands
N3 - on task: speaking peer to peer
N4 - on task: responded to instructor
N5 - on task: hands-on activity

<u>Off Task:</u>
F1 - off task: passive
F2 - off task: doing other work (cell phones)
F3 - off task: listening to others
F4 - off task: disturbing others
F5 - off task: playing

Modified observation checklist from https://www.cbwes.net/engagement.html

Appendix C: Independent Samples *t*-Test for Classroom Configuration

Classroom configuration is described as classrooms arranged differently by rows or sections		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
Equal Variances		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
The classroom configuration allows for better contact with instructor	Assumed	1.307	0.255	-0.729	149	0.467	-0.114	0.156	-0.423	0.195
	Not assumed			-0.732	148.683	0.466	-0.114	0.156	-0.422	0.194
The use of e-mail makes it easier to correspond with instructor	Assumed	0.076	0.784	-1.841	149	0.068	-0.249	0.135	-0.517	0.018
	Not assumed			-1.833	142.853	0.069	-0.249	0.136	-0.518	0.020
The classroom configuration allows more contact with instructor	Assumed	0.235	0.628	-0.269	149	0.788	-0.039	0.144	-0.324	0.246
	Not assumed			-0.270	148.916	0.788	-0.039	0.144	-0.323	0.246
The instructor's website and /or use of Blackboard makes it easier to correspond with instructor	Assumed	0.015	0.902	-3.045	149	0.003	-0.401	0.132	-0.661	-0.141
	Not assumed			-3.023	137.933	0.003	-0.401	0.133	-0.663	-0.139
The classroom configuration allows us to critique problem solutions that students put on the projector screen	Assumed	1.450	0.230	-2.014	148	0.046	-0.292	0.145	-0.578	-0.005
	Not assumed			-2.008	144.238	0.047	-0.292	0.145	-0.579	-0.005
The classroom configuration allows us to review the work of other teams more easily	Assumed	0.845	0.359	-0.620	148	0.536	-0.099	0.160	-0.416	0.217
	Not assumed			-0.621	147.997	0.536	-0.099	0.160	-0.415	0.217
Learning is easier when instructors use multiple technologies simultaneously (Projector, whiteboard, overhead, shared screens)	Assumed	1.858	0.175	0.516	149	0.607	0.088	0.170	-0.248	0.423
	Not assumed			0.518	148.918	0.605	0.088	0.169	-0.247	0.422
Detailed or complex assignments are made easier when the instructor can show us using the projector	Assumed	0.007	0.934	-1.542	149	0.125	-0.206	0.133	-0.469	0.058
	Not assumed			-1.532	140.589	0.128	-0.206	0.134	-0.471	0.060
Quizzes or tests through Blackboard give me faster feedback	Assumed	0.615	0.434	-2.585	149	0.011	-0.355	0.137	-0.626	-0.084
	Not assumed			-2.576	144.735	0.011	-0.355	0.138	-0.627	-0.083
Overall, I am more satisfied with classroom configuration	Assumed	1.793	0.183	-0.523	149	0.602	-0.077	0.148	-0.369	0.215
	Not assumed			-0.524	148.979	0.601	-0.077	0.147	-0.369	0.214
Overall, I am more satisfied with technology now available.	Assumed	10.325	0.002	-0.994	149	0.322	-0.126	0.126	-0.375	0.124
	Not assumed			-1.002	144.785	0.318	-0.126	0.125	-0.373	0.122

Appendix D: Independent Samples *t*-Test for Interactions behind Computer Screen

Please help us characterize your interactions in the classroom by answering questions as they relate to you.		Levene's Test for Equality of Variances F	Sig.	t-test for Equality of Means t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference Lower	Upper
I interact with the instructor in class.	Assumed	2.282	0.133	-0.547	149	0.585	-0.088	0.161	-0.405	0.229
	Not assumed			-0.550	147.069	0.583	-0.088	0.160	-0.403	0.228
I am involved in learning during class.	Assumed	0.135	0.714	-2.158	148	0.033	-0.258	0.120	-0.495	-0.022
	Not assumed			-2.170	144.602	0.032	-0.258	0.119	-0.493	-0.023
I am engaged in class.	Assumed	0.042	0.837	-2.695	148	0.008	-0.355	0.132	-0.615	-0.095
	Not assumed			-2.702	147.726	0.008	-0.355	0.131	-0.614	-0.095
I am attentive in class.	Assumed	0.235	0.628	-1.323	149	0.188	-0.165	0.125	-0.412	0.082
	Not assumed			-1.327	148.953	0.187	-0.165	0.125	-0.411	0.081
I participate in class discussion.	Assumed	4.179	0.043	-0.525	147	0.600	-0.094	0.179	-0.447	0.259
	Not assumed			-0.528	142.620	0.599	-0.094	0.178	-0.446	0.258
I provide my opinion on questions from the instructor during the class.	Assumed	3.485	0.064	-1.029	149	0.305	-0.171	0.166	-0.500	0.158
	Not assumed			-1.035	147.422	0.302	-0.171	0.165	-0.498	0.156
I receive feedback in class on my understanding of the course materials.	Assumed	1.555	0.214	-1.566	147	0.119	-0.240	0.153	-0.543	0.063
	Not assumed			-1.563	143.958	0.120	-0.240	0.154	-0.543	0.064
I receive feedback from the instructor during the class.	Assumed	0.006	0.937	-1.043	149	0.299	-0.160	0.154	-0.464	0.143
	Not assumed			-1.042	147.941	0.299	-0.160	0.154	-0.464	0.144
I can gauge whether I am following the course materials during the class.	Assumed	0.240	0.625	-1.051	149	0.295	-0.135	0.129	-0.390	0.119
	Not assumed			-1.051	148.275	0.295	-0.135	0.129	-0.390	0.119
I can assess my understanding of the course materials with respect to other students during the class.	Assumed	0.210	0.647	-1.389	149	0.167	-0.189	0.136	-0.458	0.080
	Not assumed			-1.383	143.297	0.169	-0.189	0.137	-0.460	0.081

Appendix E: Independent Samples *t*-Test Related to Self-Efficacy

Please help us characterize how you feel sitting behind the computer screen in the classroom by answering questions as they relate to you. Equal Variances		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
I believe I will receive an excellent grade in this class.	Assumed	0.000	0.990	-1.811	149	0.072	-0.233	0.128	-0.486	0.021
	Not assumed			-1.801	142.125	0.074	-0.233	0.129	-0.488	0.023
I'm certain I can understand the most difficult material presented in the readings in this course.	Assumed	0.295	0.588	-0.611	147	0.542	-0.089	0.145	-0.376	0.198
	Not assumed			-0.609	144.175	0.543	-0.089	0.146	-0.377	0.199
I'm confident I can understand the basic concepts taught in this course.	Assumed	1.002	0.318	-0.154	149	0.877	-0.019	0.124	-0.264	0.226
	Not assumed			-0.155	148.818	0.877	-0.019	0.124	-0.263	0.225
I'm confident I can do an excellent job on the assignments and tests in this course.	Assumed	0.259	0.612	-0.932	148	0.353	-0.132	0.142	-0.412	0.148
	Not assumed			-0.930	145.197	0.354	-0.132	0.142	-0.413	0.149
I expect do well in this class.	Assumed	2.361	0.127	-0.429	148	0.668	-0.051	0.118	-0.284	0.183
	Not assumed			-0.431	147.059	0.667	-0.051	0.118	-0.283	0.182
I'm certain I can master the skills being taught in this class.	Assumed	0.011	0.918	-2.025	148	0.045	-0.247	0.122	-0.487	-0.006
	Not assumed			-2.018	142.450	0.046	-0.247	0.122	-0.489	-0.005
Considering the difficulty of this course, the teacher, and my skills, I think I will do well in this class.	Assumed	5.053	0.026	-3.266	149	0.001	-0.342	0.105	-0.549	-0.135
	Not assumed			-3.263	147.619	0.001	-0.342	0.105	-0.549	-0.135

Appendix F: Informed Consent Form

Informed Consent Form

Study Title: BEHIND THE SCREEN: AN EXPLORATION OF COLLEGE STUDENTS PRACTICE OF INTELLECTUAL SELF-EFFICACY IN COMPUTER LAB CLASSROOMS

Study Purpose and Rationale

The purpose of this study is to explore the relationship of feedback, motivation, and engagement concerning intellectual self-efficacy in a computer lab classroom. I am seeking undergraduate students who are enrolled in an Introduction to Business and Computer Applications course to learn more about their experiences in class. The results of this study will provide insight into developing active learning strategies that encourages positive interactions in a computer lab classroom.

Inclusion/Exclusion Criteria

Participants must be an active Ball State University at least 18 and enrolled in an Introduction to Business and Computer Applications course selected for the study. Students under the age of 17 and not enrolled in an Introduction to Business and Computer Applications selected will be excluded in the study.

Participation Procedures and Duration

For this project, students will be asked to complete an online survey about their interaction with various technological tools that currently exists within the computer lab classrooms. The online survey will take approximately 5-10 minutes to complete the survey.

Data Confidentiality or Anonymity

All data will be maintained as anonymous and no identifying information such as names will appear in any publication or presentation of the data.

Storage of Data

Online data will be stored in Qualtrics for five years and then deleted. The data will also be entered into a software program and stored on the researcher's password-protected computer for five years and then deleted. Only members of the research team will have access to the data. At the end of the five years, all data will be permanently removed from all software and computers.

Risks or Discomforts

There are no perceived risks for participating in this study.

Benefits

There are no perceived benefits for participating in this study.

Voluntary Participation

Your participation in this study is voluntary, and you are free to withdraw your permission at any time for any reason without penalty or prejudice from the investigator. Please feel free to ask any questions of the investigator before starting the survey and at any time during the study.

IRB Contact Information

For questions about your rights as a research subject, please contact the Director, Office of Research Integrity, Ball State University, Muncie, IN 47306, (765) 285-5070 or at irb@bsu.edu.

Researcher Contact Information

Principal Investigator: Cynthia S Cash
Graduate Student in Educational Studies
Ball Communications (BC), Room 220
Ball State University
Muncie, IN 47306-0625 Phone:765-285-6794

Faculty Advisor: Dr. Karen Ford
Associate Professor of Curriculum and Instruction
Department of Educational Studies
Ball State University
kford@bsu.edu